Service Manual

Datascope
Passport® V

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Foreword

The **Passport V** Service Manual is intended as a guide for technically qualified personnel during repair and calibration procedures. This publication may have been updated to reflect product design changes and/or manual improvements.

Warnings, Cautions, and Notes

Please read and adhere to all warnings, cautions, and notes listed here and in the appropriate areas throughout this manual.

A **WARNING** is provided to alert the user to potential serious outcomes (death, injury, or serious adverse events) to the patient or the user.

A **CAUTION** is provided to alert the user to use special care necessary for the safe and effective use of the device. They may include actions to be taken to avoid effects on patients or users that may not be potentially life threatening or result in serious injury, but about which the user should be aware. Cautions are also provided to alert the user to adverse effects on this device of use or misuse and the care necessary to avoid such effects.

A **NOTE** is provided when additional general information is applicable.

Warnings

WARNING: The Passport V operates on line voltages. Therefore, an electric shock hazard may exist when the instrument covers are removed. Repair and calibration procedures should only be performed by qualified personnel who proceed with care and follow proper servicing techniques. Warnings are given in various chapters, as well as in other appropriate locations.

WARNING: Internal Electrical Shock Hazard - This unit does not contain any user-serviceable parts. Do not remove instrument covers. Refer Servicing to qualified personnel.

WARNING: Whenever the monitor is opened for calibration or repair, a risk (leakage) current safety check and a verification of basic functions of all parameters should be performed before the monitor is returned to Clinical use. See "Verification" on page 5-12.

WARNING: Do not clean the monitor while it is powered on and/or plugged in.

WARNING: Perform the decontamination process with the unit powered off and the power cord removed.

Cautions

CAUTION: Calibration is not to be performed while monitoring a patient.

CAUTION: A functional tester cannot be used to assess the accuracy of the pulse oximeter probe or a pulse oximeter monitor.

CAUTION: **When cleaning the monitor, do not allow cleaning solutions into the vent openings.**

CAUTION: **When cleaning sensors, do not use excessive amounts of liquid. Wipe the sensor surface with a soft cloth dampened with cleaning solution. Do not attempt to sterilize.**

CAUTION: **Some disinfectants may cause skin irritation. Please rinse cuff thoroughly with water to remove any residual disinfectants.**

CAUTION: **Using dark colored soaks may stain the cuffs. Test a single cuff to ensure that no damage will occur.**

CAUTION: **When ironing or pressing the cuffs, be aware that the Velcro® fasteners can melt at temperatures above 325°F (162°C).**

CAUTION: **Disposable cuffs can be cleaned using a mild soap solution and dried with a clean cloth.**

CAUTION: **Do not clean the Gas Module while it is on and/or plugged in.**

CAUTION: **The internal sampling system of the Gas Module does not need to be cleaned or sterilized. There is no reverse flow back to the patient. If the internal sampling system is suspected to be clogged or dirty, the module should be serviced by an authorized service person only.**

CAUTION: **To avoid permanent damage, do not expose metal components (e.g., pins, sockets, snaps) to disinfectants, soaps, or chemicals.**

CAUTION: **Recharge batteries in the Passport V.**

CAUTION: **Remove the batteries if the Passport V is not likely to be used for an extended period of time.**

CAUTION: **Never pull the recorder paper with force when a recording is in process; it may cause damage to the recorder.**

CAUTION: **Do not leave the recorder door open unless reloading paper or troubleshooting.**

Notes

NOTE: **Unauthorized servicing may void the remainder of the warranty. Check with the factory or with a local authorized representative to determine the warranty status of a particular instrument.**

1.0 *Theory of Operation*

1.1 Introduction

This patient monitor is intended to be used for monitoring, displaying, reviewing, storing, and transferring of multiple physiological parameters including: ECG, respiration (Resp), temperature (Temp), SpO_2, pulse rate (PR), non-invasive blood pressure (NIBP), invasive blood pressure (IBP), End tidal CO_2 value ($EtCO_2$) and anesthetic gas (AG) of single adult, pediatric, and neonatal patients.

FIGURE 1-1 The **Passport V** Monitor

Additional **Passport V** features:

- Provides audible and visual alarm indications.
- Incorporates multiple input devices such as a keypad and knob.
- Enables program upgrade over the network.

1.2 System Connections

1.2.1 Mounting the Patient Monitor

The **Passport V** can be mounted on a wall mount bracket, a rolling stand, or a bedrail hook, which can be ordered optionally. Each type of mounting solution is delivered with a complete set of mounting hardware and instructions. Refer to the documentation delivered with the mounting hardware for instructions on assembling mounts.

1.2.2 Connectors for Peripheral Devices

On the back of the **Passport V** are the connectors for peripheral devices.

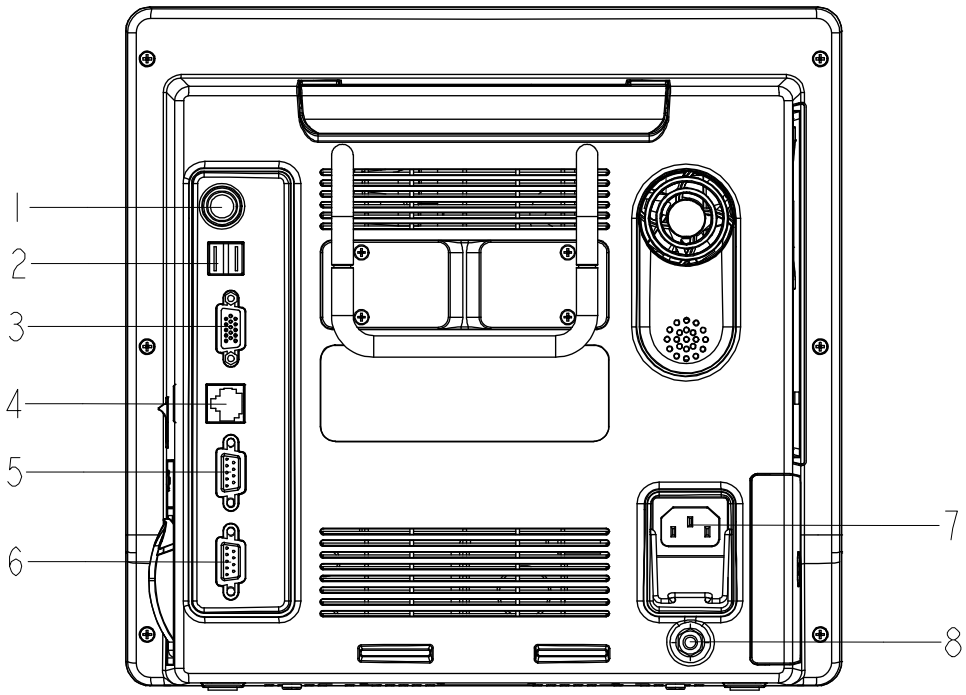

FIGURE 1-2 Connectors for Peripheral Devices

1. **Auxiliary Output**
   A standard BNC connector, through which defibrillator synchronization signals, analog output signals, and nurse call signals can be outputted, depending on how the monitor is configured.
2. **SB Connector**
   A connector for an external storage device.
3. **VGA Connector**
   A connector for a standard SVGA color monitor.
4. **Network Connector**
   An RJ45 connector, through which an Ethernet network or a PC can be connected.
5. **RS232 serial port**
   A DB9 connector, used to connect a PC for data or a Gas Module 3, depending on how the monitor is configured.
6. **RS232 serial port**
   A DB9 connector, used to connect a PC for data or a Gas Module 3, depending on how the monitor is configured.
7. **AC Power Connector**
   A connector for an AC power source (100 to 240 VAC, 50/60Hz).
8. **Equipotential lug**
   A connector for common ground with other equipment.

1.3 Main Unit

The **Passport V** consists of the following:

- **Input system:**
  keypad, knob, and power switch.
- **Output system:**
  LCD panel, alarm LED board, recorder, speaker, AC/battery status LEDs).
- **Processing and communications system:**
  CPU board, Power management and interface board.
- **Power management system:**
  battery, battery interface board, power board (AC/DC), Power management and interface board.
- **Equipment interface system:**
  power management and interface board, Ethernet-wireless adapter.
- **Parameter modules:**
  multi-parameter board, CO_2 module, OEM SpO_2 module, NIBP module.

Additionally, the patient monitor can also connect a DPM SB storage device, a Gas Module 3, or a PC for data transfer.

The following diagram illustrates the structure of the patient monitor.

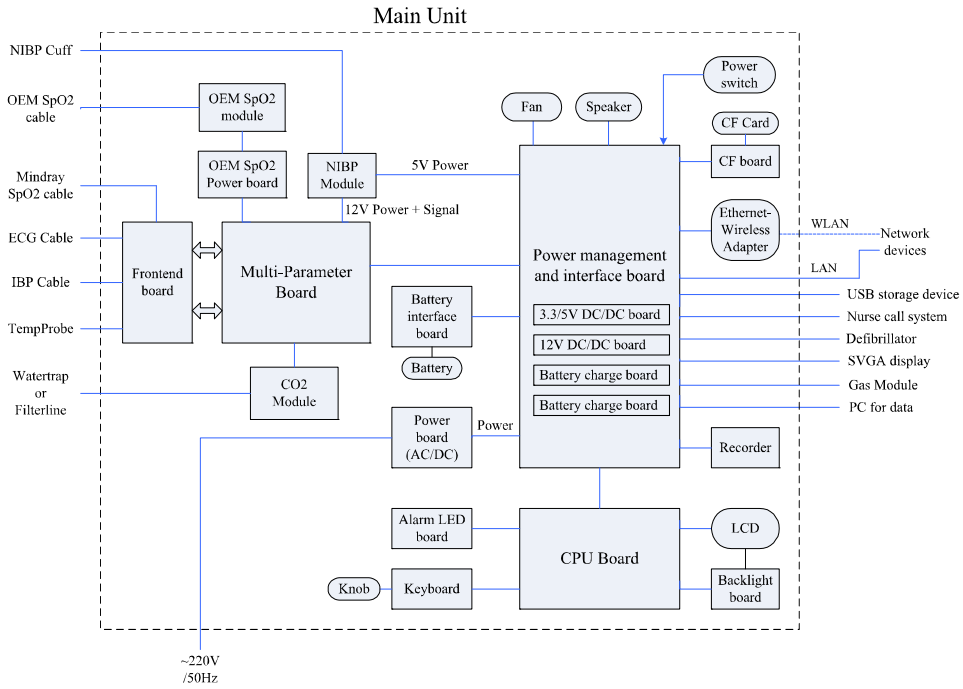

FIGURE 1-3 Patient monitor structure

1.3.1 Input System

Keypad

The keypad, located at the lower part of the monitor's front panel, contains 18 keys, AC status LED and battery status LED, and also provides a connection for the knob to the CPU board.

Knob

The knob can be pressed, or rotated either clockwise or counter-clockwise. It connects to the keypad.

Power switch

The power switch, located at the right side of the monitor, is a single-throw rocker switch. Pressing it will power the monitor on or off. The power switch's status is detected by the power management and interface board.

1.3.2 Output System

LCD Panel

The monitor uses an LCD panel with a resolution of 800x600, which runs power and gets digital signals from the CPU board. The backlight is powered by the backlight board, which is powered by the CPU board.

Alarm Lamp

The monitor has an alarm lamp on the front panel. The alarm LED board converts the electric signals into visual signals and then sends the visual signals to the alarm lamp through a light pipe. The alarm lamp illuminates either red or yellow, depending on how the alarm is configured.

Recorder

The recorder receives data coming from the CPU board through a UART and then sends them to the thermal print head for printing. The recorder has a hard key (starting/stopping recordings) and a green LED on its front. It connects to the power management and interface board.

The following diagram shows its operating principle.

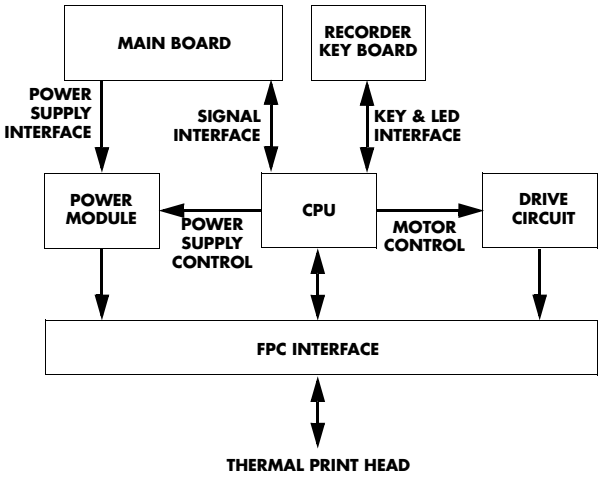

FIGURE 1-4 Operating principle

MODULE	DESCRIPTION
Power supply interface	Introduces a DC from the CPU board.
Power module	Converts the input power into voltages that fit each module and then forwards them to each module.
CPU	Controls the communications between modules.
Signal interface	Controls the communications between the CPU board and the recorder CPU.
Drive circuit	Receives control signals from the CPU and then forwards them to the stepper motor.
Recorder key board	Sends key commands to the CPU and receives commands from the CPU to control the LED on the recorder.
FPC interface	Sends the thermal print head information to the CPU and receives commands from the CPU to control the thermal print head.

Speaker

The speaker provides sound for alarms, key strokes, heart beats, pulse, and so on. It is driven directly by the CPU board.

AC and battery status LEDs

The AC status LED and the battery status LED, located at the keypad, are controlled by the MCU on the power management and interface board. The driving signals come from the power management and interface board and then go to the keypad via the CPU board.

1.3.3 Processing and Communications System

CPU board

The CPU board is the heart of the patient monitor. It implements a series of tasks including input and output control, data storage and processing, display processing, system control, communication management, print management, alarming, etc.

The CPU board has a CPU system comprising the CPU, FLASH, memory, real-time clock, EEPROM, FPGA, etc. Among them, FPGA deals with audio, video, and interfacing signals. Also, it provides interfaces to other boards, modules, and devices.

Connections and communications with other components are implemented via the CPU board, which provides interfaces to:

- A built-in display
- The power management and interface board. Between this board and the CPU board, the signals of USB+Network+UART+SVGA+I2C+Speaker+GPIO are communicated. Among them, UART signals finally go to the parameter boards.
- The keypad. Between the keypad and the CPU board, there are two signal wires: one is the UART signal wire and another is the AC power and battery status signal wire.
- The alarm LED board

Power management and interface board

The power management and interface board is a multi-functional board. It transmits UART signals to several boards and modules (e.g., multi-parameter board, CO_2 module, OEM SpO_2 module, NIBP module, recorder module, etc.).

1.3.4 Power Management System

Battery

The monitor uses two rechargeable lithium-ion batteries (11.1 V, 4400 mAh). The battery compartment door is located at the left-bottom of the patient monitor. The battery power is introduced to the power module via the battery interface board, and then processed and distributed to each component by the power management and interface board.

Battery interface board

The battery interface board serves as an interface between the batteries and the power management and interface board.

Power board (AC/DC)

The power board (AC/DC) converts the input AC power to DC power (16.8V DC), which then serves as the input of the power management and interface board.

Power management and interface board

This board is responsible for power management and interfaces. Power management can perform the functions below:

1. Auto-select the DC source between the power board and the two batteries.
2. Convert the DC source into 12V, 5V, and 3.3V DC and then output them to other boards and modules.
3. Provide over-voltage and under-voltage protection for 12V, 5V, and 3.3V DC.
4. Detect the power switch status and control power on/off.
5. Detect the battery capacity and control battery charge/discharge.
6. Control the LED for battery and AC status.
7. Control the fan and detect its running status (the complex control algorithm is implemented via the CPU board).
8. Detect the internal temperature of the patient monitor.

On this board there are four sub-boards: 3.3V and 5V DC board, 12V DC board, and two battery charge boards. The 3.3V and 5V DC board converts the DC source into 5V and 3.3V. The 12V DC board converts the DC source into 12V DC. Both of them have an over-current protection mechanism. Each of the two battery charge boards controls the charging of a battery.

The DC power system is illustrated below:

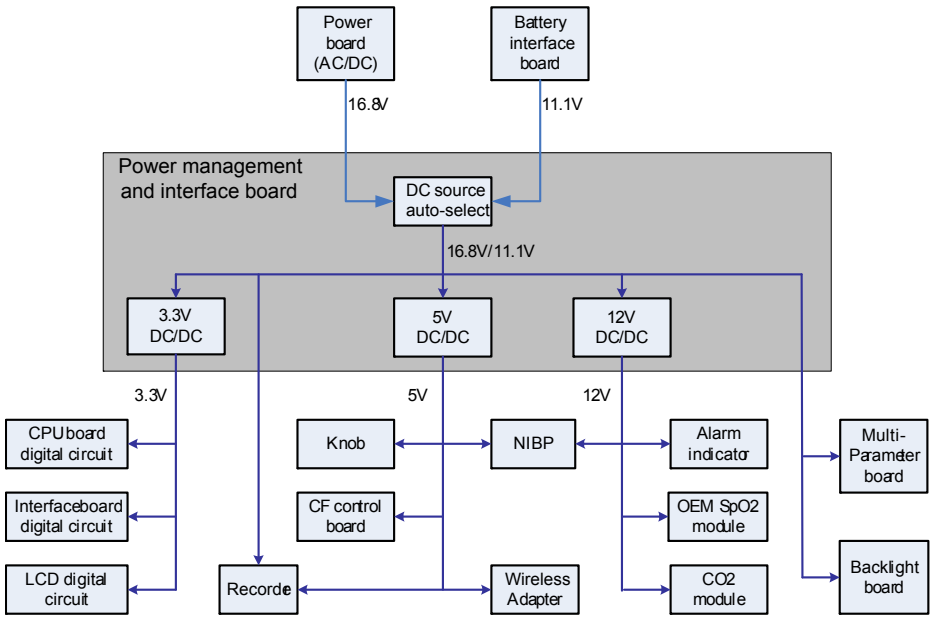

FIGURE 1-5 DC power system

1.3.5 Equipment Interface System

Power management and interface board

This board is also responsible for digital interfaces.

A USB HUB is located at the board. It receives USB signals from the CPU and then distributes them to three USB ports, of which two connect the USB sockets, and the other connects the CF control board.

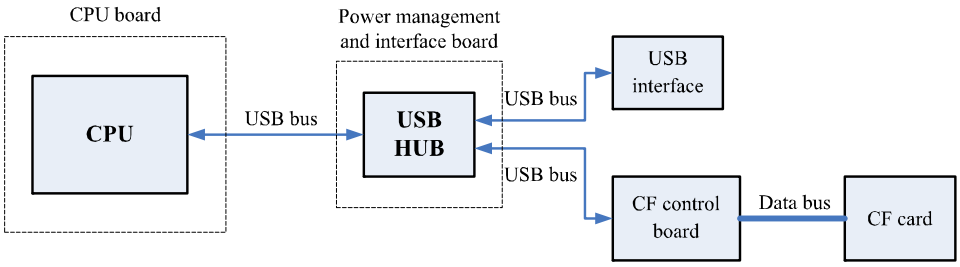

FIGURE 1-6 The USB hub

This board provides connections for both wired network and wireless adapter. In the figure below, switch 2 always stays off during normal use. The operator can switch between wired network and wireless adapter through the software UI. Then, the CPU applies the operator's selection by controlling switch 1. In configuration mode, the CPU turns off switch 1 and then turns on switch 2 so that the operator can connect a PC to the wired network to configure the wireless adapter.

The Ethernet wireless adapter enables the patient monitor to go wireless.

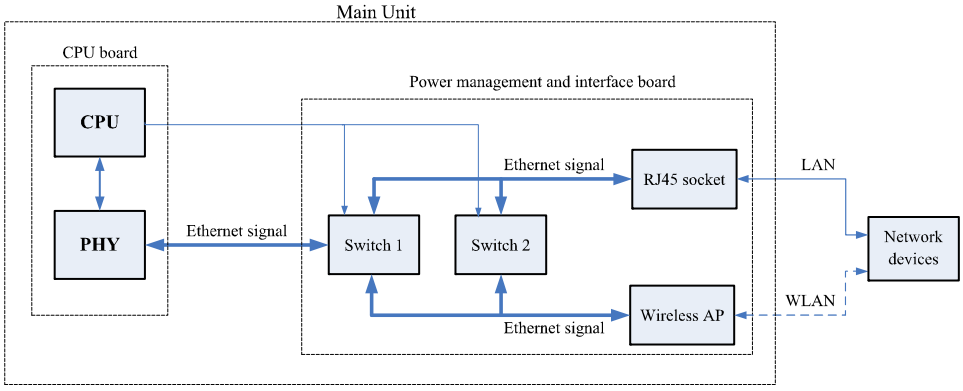

FIGURE 1-7 The ethernet wireless adapter

The CPU generates analog signals by controlling the DAC chip on the power management and interface board via the I2C bus. The analog signals are transmitted to the BNC socket via the amplifier circuit.

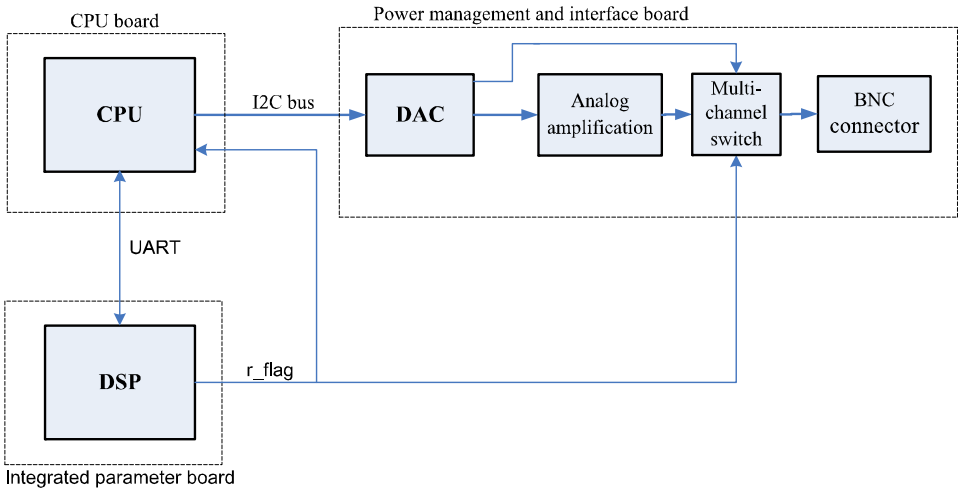

FIGURE 1-8 The amplifier circuit

The signal r_flag from the multi-parameter board goes to the power management and interface board. The CPU can select the source of defibrillator synchronization signals by controlling the output of the DAC. The signal r_flag also goes to the CPU for a self-test.

Two UART interfaces (serial port 1 and serial port 2) from the CPU board are extended as two RS232-level ports via the power management and interface board. Both interfaces can be configured to accommodate a PC for data or an AG module.

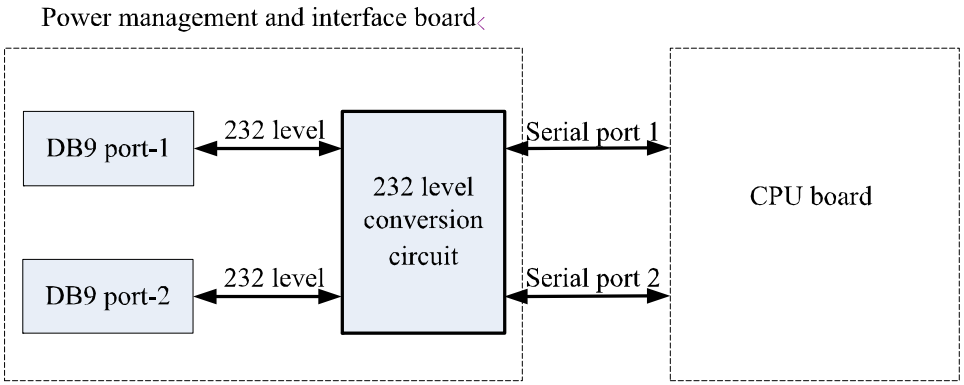

FIGURE 1-9 The serial ports

1.3.6 Parameter modules

Multi-Parameter board

The multi-parameter board incorporates multiple parameters, such as ECG, RESP, DPM SPO_2, 2-channel IBP, TEMP, etc. Details include the following:

- The multi-parameter board employs a high-speed DSP, making digital filtering, arrhythmia analysis, and ST analysis faster and more effective.
- The DSP is in charge of 3- and 5-lead ECG monitoring, arrhythmia and ST analysis, RESP monitoring, and communicating with the CPU board.
- The multi-parameter board also employs an MCU, which supports 1-channel temperature measurement, DPM SpO_2, and 2-channel IBP measurement. The MCU transfers all the measurement data to the DSP.
- Respiration rate is monitored using the impedance method and can only be measured with two ECG leads.
- The multi-parameter board integrates the DPM SpO_2 circuit. If a monitor is configured with an OEM SpO_2 module, then DPM SpO_2 functions are overridden.

CO_2 Module

- There are two types of CO_2 modules: DPM CO_2 and Microstream CO_2.
- The DPM CO_2 module measures the CO_2 concentration using the NDIR technology. It performs a zero calibration periodically to ensure accurate measurements for a long period of time. An appropriate compensation can be applied according to the patient environment, thus preventing measurements from being influenced by interfering gases.
- The Microstream CO_2 module ensures that measurements will not be affected by other gases and the accuracy can be maintained without any gas compensation. Additionally, the module has a very low sample flow rate, reducing its effect on the patient and the environment to a minimum.

OEM SpO_2 Module

There are two types of OEM SpO_2 modules: Masimo-2013 SpO_2 module and Nellcor SpO_2 module.

An isolation power board is attached to each of them and used to isolate the DC power and the UART signal of the OEM SpO_2 modules from other circuits in the main unit. The UART signal comes from the CPU board and passes through the power management and interface board.

NIBP Module

The figure below shows the NIBP module parameter board diagram.

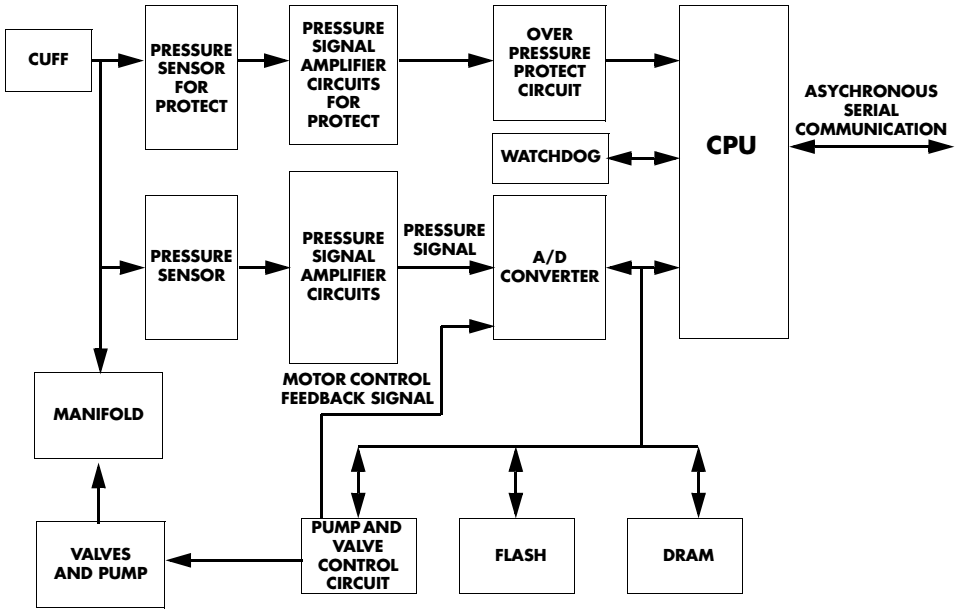

FIGURE 1-10 The NIBP module parameter board

The **Passport V** calculates NIBP values using the oscillometric method of noninvasive blood pressure measurement. These measurements correspond to comparisons with auscultatory values, measured using the fifth Korotkoff sound within ANSI/AAMI SP10 standards for accuracy.

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2.0 *Block Diagrams*

2.1 Introduction

The Block Diagrams indicate the internal organization of the instrument. The block diagrams are used to gain both familiarity with the instrument and to locate malfunctioning PC boards as readily as possible.

DESCRIPTION	PART NUMBER
NIBP Module	6100-30-86329
Masimo SpO_2 Module	6100-30-86335
Nellcor SpO_2 Module	6100-30-86336
Microstream CO_2 Module	6100-30-86333
DPM CO_2 Module	6100-30-86334
Power board(AC/DC)	9211-30-87311
Alarm LED Board	9211-30-87306
Battery interface board assembly	9211-30-87331
Keypad Overlay	6100-20-86264-XX or 6100-20-86341-XX
Keypad	6100-20-86265-XX
Main board	9211-20-87303
Power management and interface board	6100-20-86294
Back light board	022-000001-00
LCD Display	0000-10-11092
Recorder	6101-30-46619
Wireless AP Module	6100-30-86332
CF card assembly	6100-30-86330
Power Switch with Cable Assembly	6100-21-86306
Speaker	020-000001-00
Fan Assembly	6100-21-86315

NOTE: See Isometric Drawings and Parts List for a complete list of Part Numbers.

2.2 Block Diagram

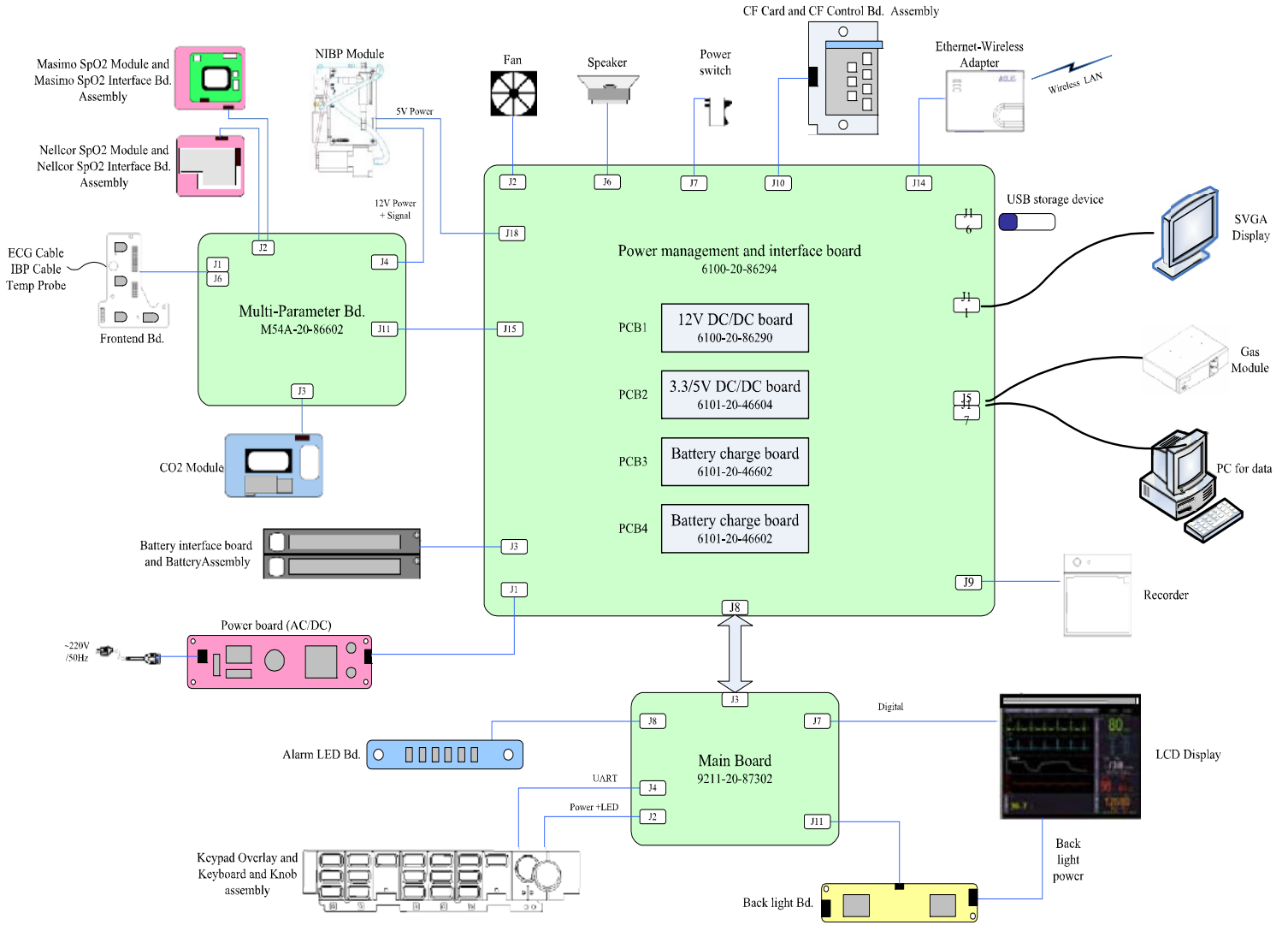


FIGURE 2-1 Passport V Block Diagram

3.0 *Repair Information*

3.1 Introduction

This chapter provides the necessary technical information to perform repairs on the **Passport V**. The most important prerequisites for effective troubleshooting are a thorough understanding of the instrument functions as well as understanding the theory of operation.

3.2 Safety Precautions

In the event the instrument covers are removed, observe the following warnings and guidelines.

1. Do not short component leads together.
2. The instrument covers must not be removed by anyone other than qualified technical personnel who have received supplementary instructions regarding maintenance of medical equipment or have equivalent experience in this area.

WARNING: Internal Electrical Shock Hazard - This unit does not contain any user-serviceable parts. Do not remove instrument covers. Refer Servicing to qualified personnel.

WARNING: Whenever the monitor is opened for calibration or repair, a risk (leakage) current safety check and a verification of basic functions of all parameters should be performed before the monitor is returned to Clinical use. See "Verification" on page 5-12.

3.3 Troubleshooting Guidelines

1. **Identify the problem**
   Due to the wide variety of potential symptoms, certain problems may be more subtle than others. One approach to troubleshooting is to set up the instrument as described in Chapter 5.0. Following the guidelines of the tests will help determine the problem if one exists.
2. **Avoid shorting component leads**
   During repair procedures, it can become tempting to make a series of quick measurements. Always turn the power off before connecting and disconnecting the test leads and probes. The accidental shorting of leads can easily stress the components and cause a second failure (aside from the safety risk).
3. **Use the Proper equipment**
   The equipment listed below is suggested to fulfill a wide range of troubleshooting requirements. It is imperative to use the designated equipment in order to ensure proper results of any and all test procedures.
4. **Clean up the repair area**
   After any repair, especially after any soldering or desoldering, clean off the repair area with alcohol and a stiff brush. This will remove any residual solder flux, in turn allowing the instrument to return to its original appearance.

3.4 Special Tools Required

- Digital Voltmeter
- Digital Mercury Manometer – 0 to 300 mmHg
- Safety Analyzer
- Patient Simulator
- Test Chamber / Dummy Cuff (P/N 0138-00-0001-01 (700 cc) or -03 (500 cc))
- Desktop PC or notebook PC.
  - Microsoft Windows 2000/XP operating system
  - Intel Pentium CPU, above 500MHz
  - Above 128M memory
  - At least one network card and at least one USB port
- CAT-5 crossover cable
- USB cable or DPM SB storage device

3.5 Disassembly Instructions

Before disassembling the unit, perform the following:

- Power down the unit and remove the line cord.
- Remove all cable assemblies from the left side, right side, and rear of the unit.
- Remove any batteries that were installed.
- Perform all work on a properly grounded ESD workstation.

3.5.1 Removal of the Key Panel and Keys

1. Place the unit on a protective surface.
2. Carefully remove the knob with a pair of pliers that have protection on the jaws. Some pliers may damage the knob.

FIGURE 3-1 Remove the knob

3. Release the key panel's four clips from the bottom of the unit with a flat-bladed screwdriver.

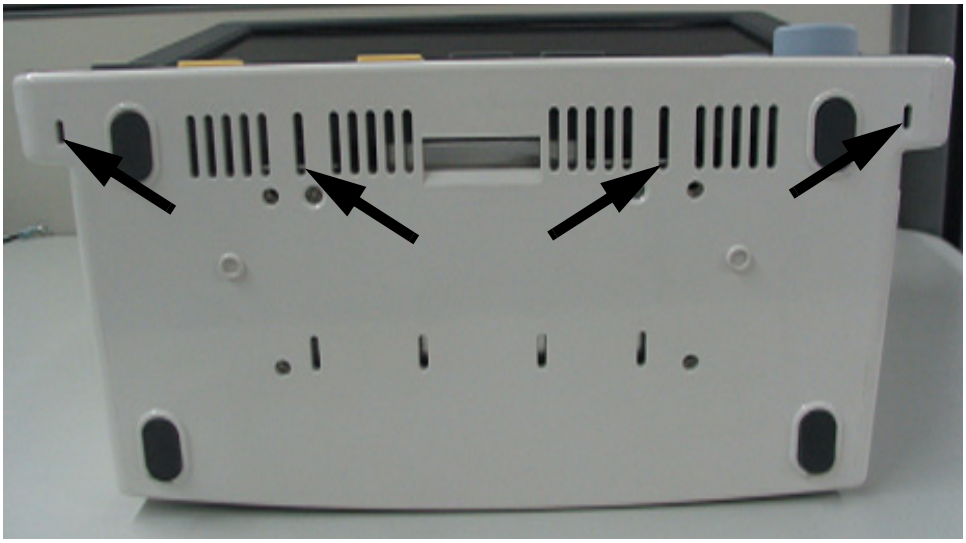


FIGURE 3-2 Release the key panel clips

4. Remove the key panel from the front.
5. Remove the keys and place to the side with the key panel.

3.5.2 Removal of the Front Housing Assembly

1. Place the unit face down on a protective surface.
2. Remove the six screws from the rear of the unit.

FIGURE 3-3 Remove the screws from the rear of the unit

3. Turn the unit over and carefully separate the front housing assembly and rear housing assembly.
4. Disconnect the 50-pin ribbon cable from the front housing assembly.

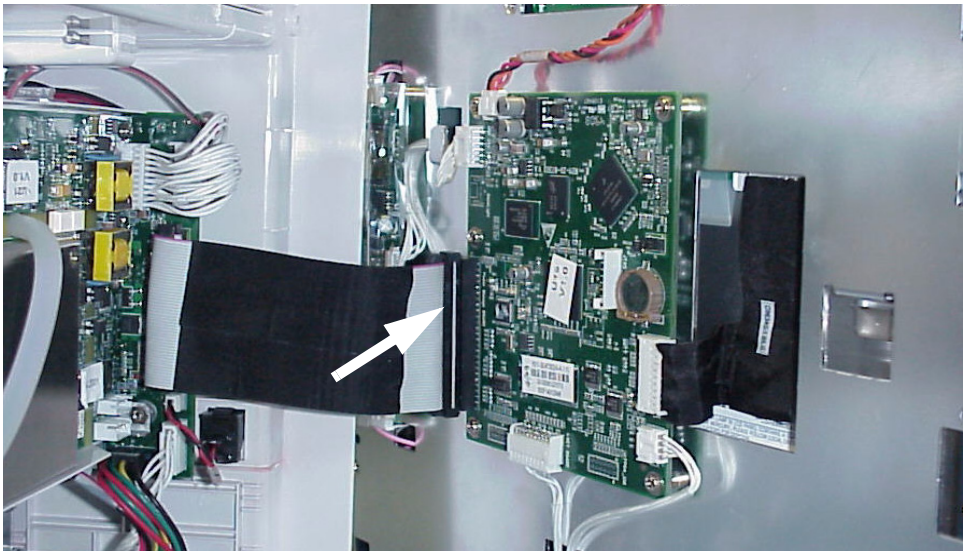


FIGURE 3-4 Disconnect the ribbon cable from the front housing assembly

5. Remove the front housing assembly.

3.5.3 Removal of the Main Board

1. Remove the front housing assembly as stated in "Removal of the Front Housing Assembly" on page 3-4.
2. Remove the keyboard cable.
3. Remove the inverter cable.
4. Remove the LCD panel cable.
5. Remove the alarm LED board cable.
6. Remove the five screws that secure the main board to the front housing bracket.
7. Remove the main board carefully.

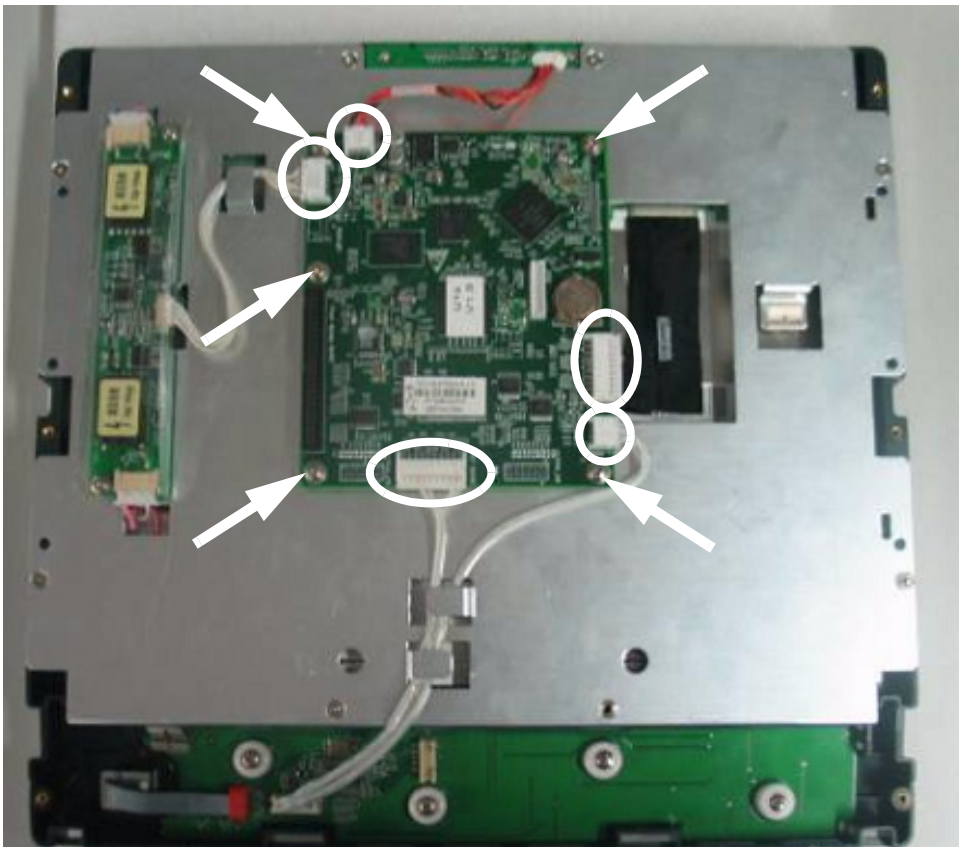


FIGURE 3-5 Remove the main board

3.5.4 Removal of the Inverter

1. Remove the front housing assembly as stated in "Removal of the Front Housing Assembly" on page 3-4.
2. Remove the inverter cable.
3. Remove the two backlight board cable from the inverter.
4. Remove the two screws that secure the inverter to the front housing bracket.
5. Remove the inverter carefully.

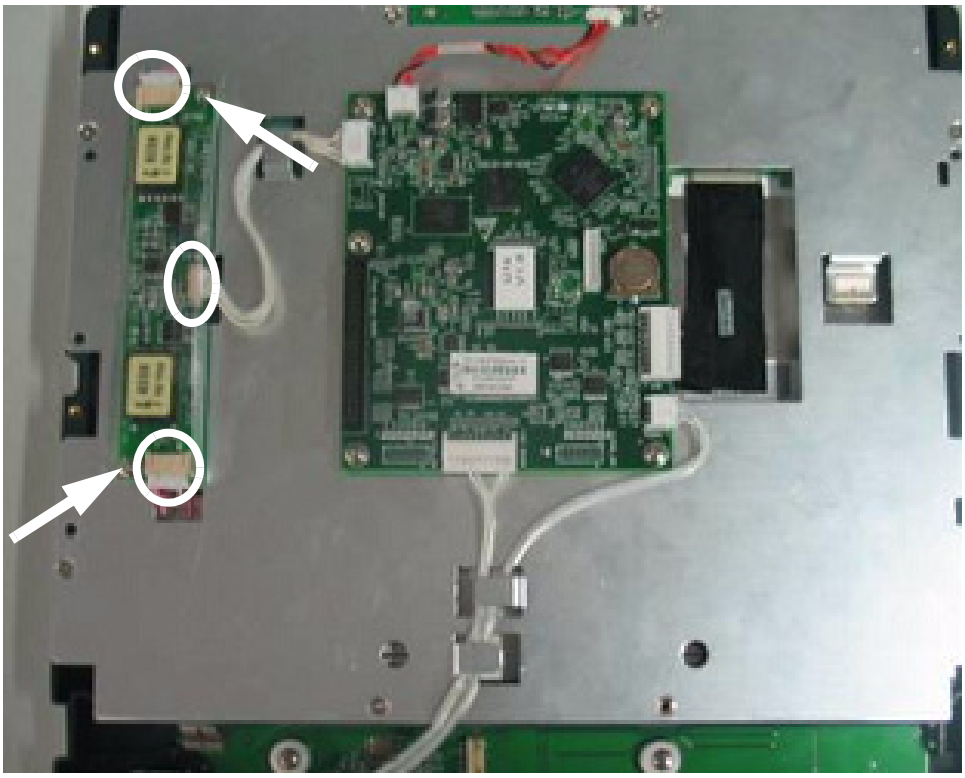


FIGURE 3-6 Remove the inverter

3.5.5 Removal of the LCD Panel

1. Remove the front housing assembly as stated in "Removal of the Front Housing Assembly" on page 3-4.
2. Remove the two backlight board cables from the inverter.
3. Remove the keyboard cable.
4. Remove the alarm LED board cable.
5. Remove the LCD panel cable.
6. Remove the eight screws that secure the front housing bracket.
7. Remove the front housing bracket and place to the side.

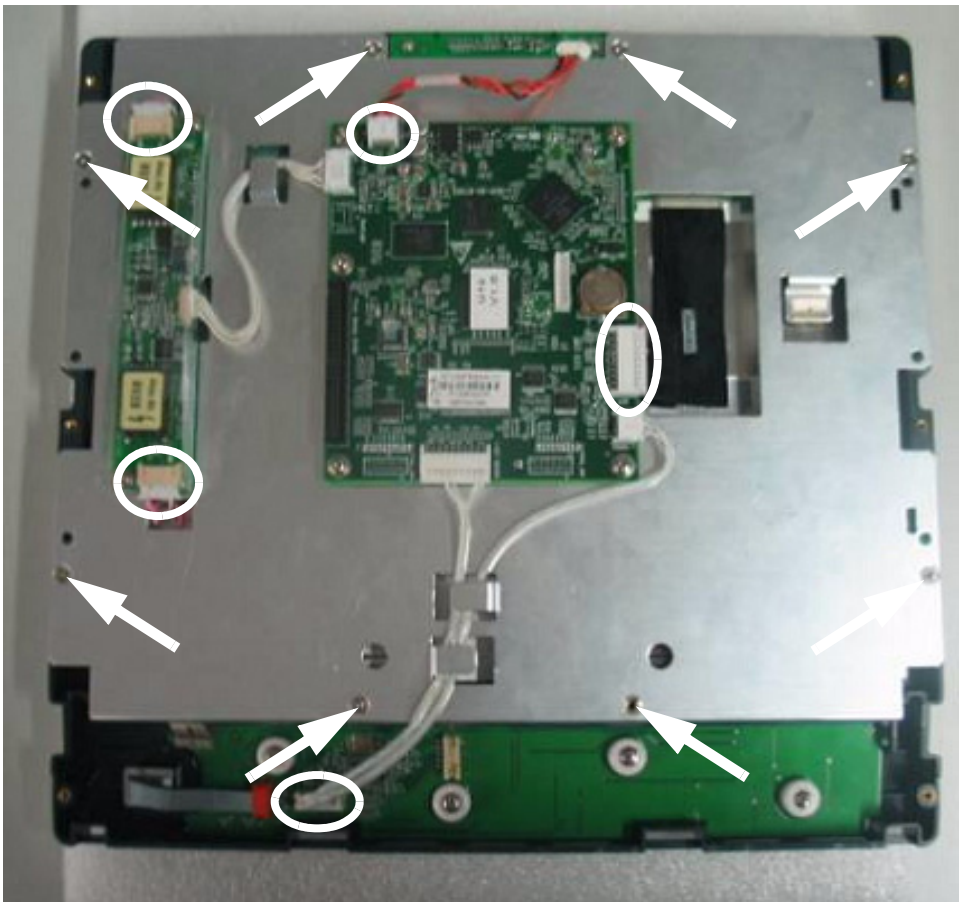


FIGURE 3-7 Remove the LCD panel

8. Remove the four screws that secure the LCD panel.
9. Remove the LCD panel carefully.

FIGURE 3-8 Remove the LCD panel

3.5.6 Removal of the Keyboard

1. Remove the front housing assembly as stated in "Removal of the Front Housing Assembly" on page 3-4.
2. Remove the keyboard cable.
3. Remove the encoder cable.
4. Remove the four screws that secure the keyboard to the front housing.
5. Remove the four keyboard pads.
6. Release the clip on the right side of the keyboard and remove the keyboard carefully.

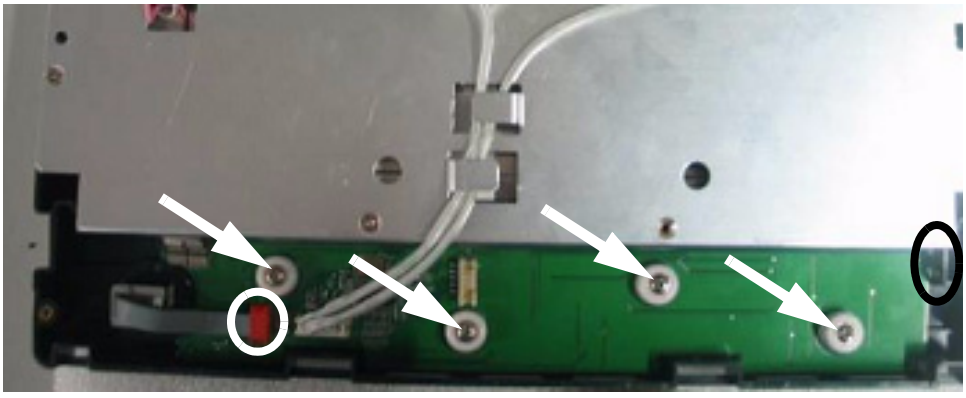


FIGURE 3-9 Remove the Keyboard

3.5.7 Removal of the Alarm LED Board

1. Remove the front housing assembly as stated in "Removal of the Front Housing Assembly" on page 3-4.
2. Remove the alarm LED board cable.
3. Remove the two screws that secure the board to the front housing.
4. Remove the alarm LED board and light conducting pipe carefully.

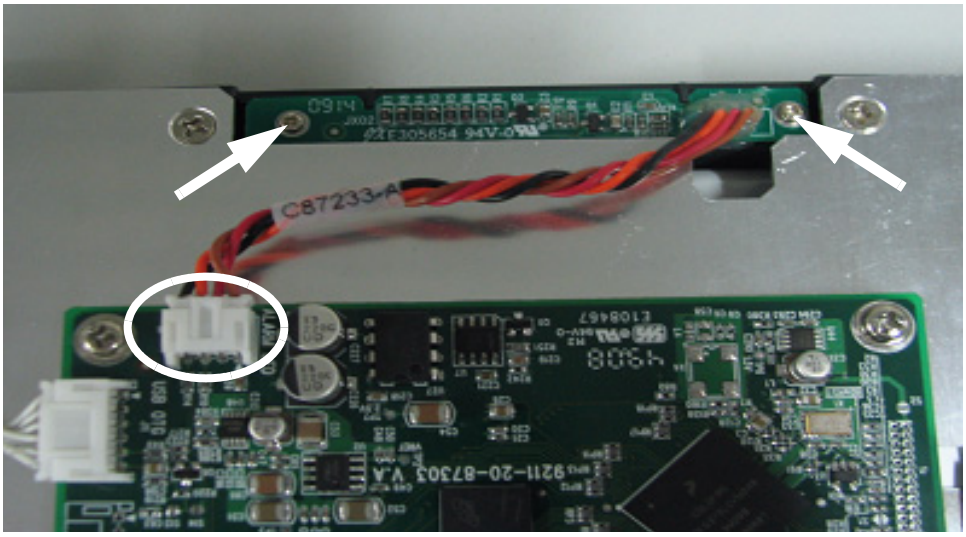


FIGURE 3-10 Remove the alarm LED board

3.5.8 Removal of the Encoder

1. Remove the front housing assembly as stated in "Removal of the Front Housing Assembly" on page 3-4.
2. Remove the encoder cable from the keyboard.

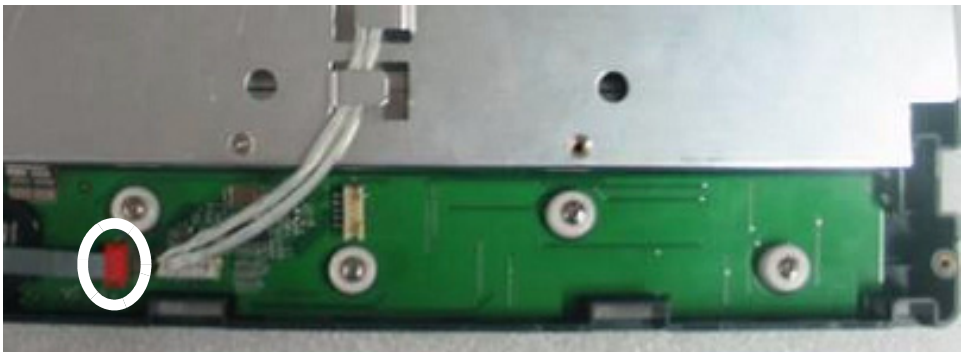


FIGURE 3-11 Disconnect the encoder cable

3. Carefully remove the knob with a pair of pliers that have protection on the jaws. Some pliers may damage the knob.
4. Remove the nut that secures the encoder.
5. Remove the encoder carefully.

FIGURE 3-12 Remove the encoder

3.5.9 Removal of the Multi-parameter Board Assembly

1. Remove the front housing assembly as stated in "Removal of the Front Housing Assembly" on page 3-4.
2. Disconnect the 50-pin ribbon cable from the interface board.
3. Disconnect the cable from J15 of the interface board.
4. Disconnect the NIBP communication cable from the interface board.

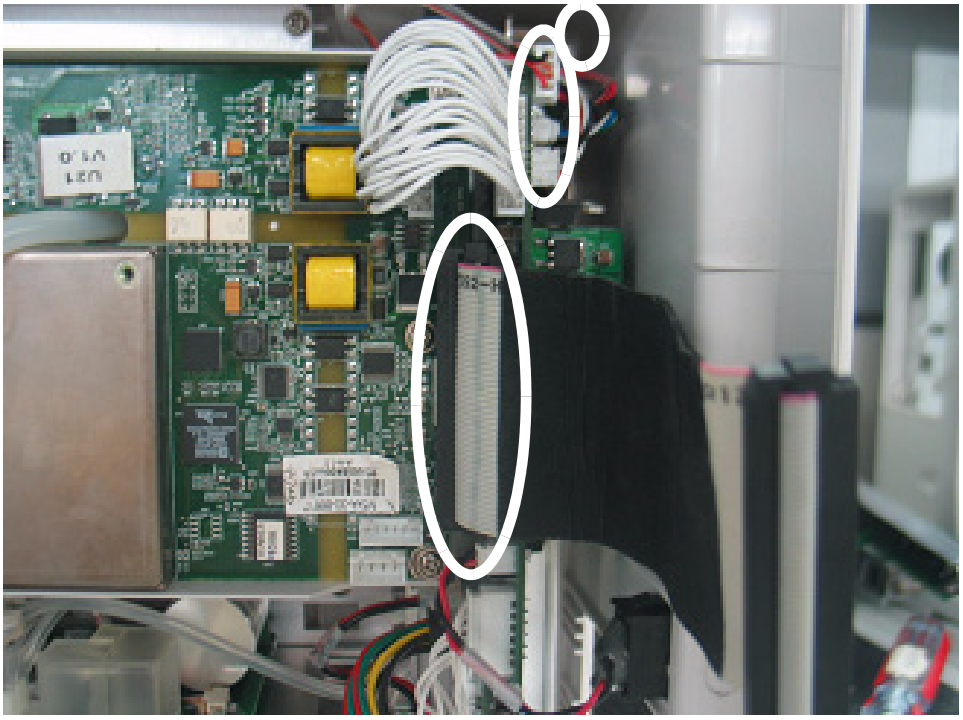


FIGURE 3-13 Disconnect the cables from the multi-parameter board

5. Remove the four screws that secure the assembly to the rear housing and main frame.
6. Disconnect the CO_2 tubing and cable from the multi-parameter board assembly (if CO_2 module is configured).
7. Remove the multi-parameter board assembly carefully.

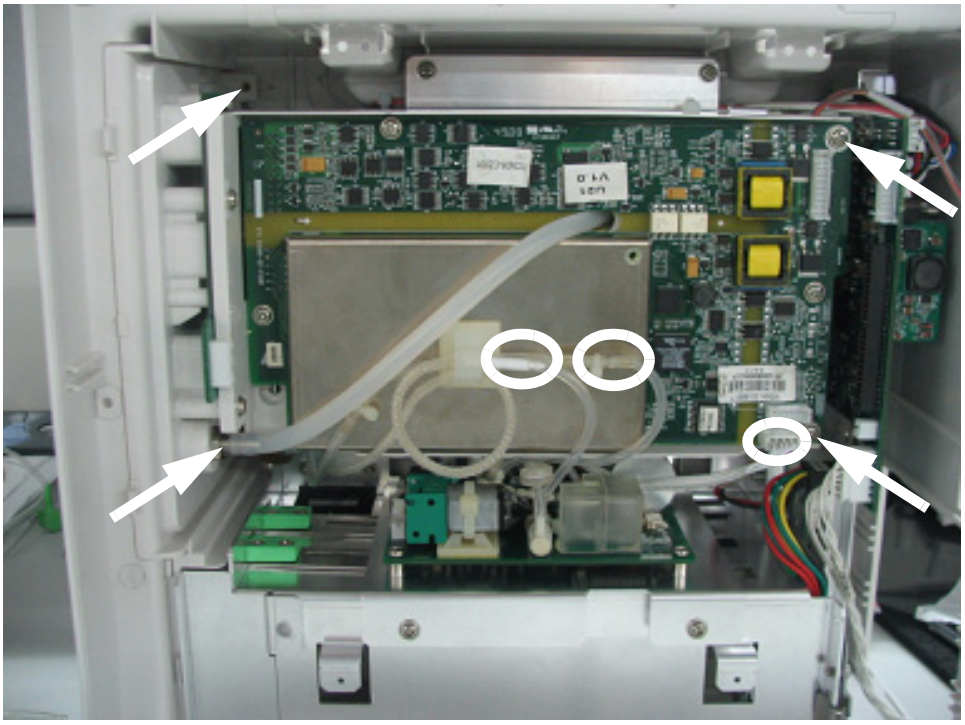


FIGURE 3-14 Remove the multi-parameter board assembly

3.5.10 Removal of the Parameter Front Panel Assembly

1. Remove the multi-parameter board assembly as stated in "Removal of the Multi-parameter Board Assembly" on page 3-10.
2. Unplug the tubing from the NIBP connector.

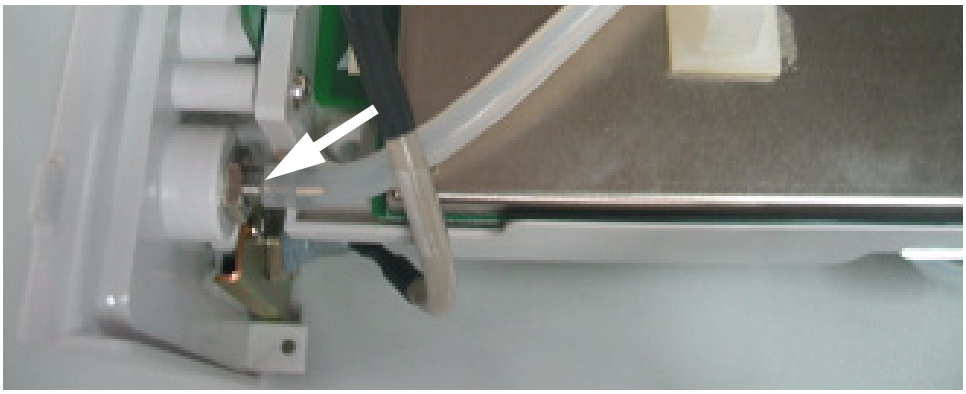


FIGURE 3-15 Unplug the tubing from the NIBP connector

3. Unfasten the two screws that secure the SpO_2 connector and then remove the connector (if Masimo or Nellcor SpO_2 module is configured).

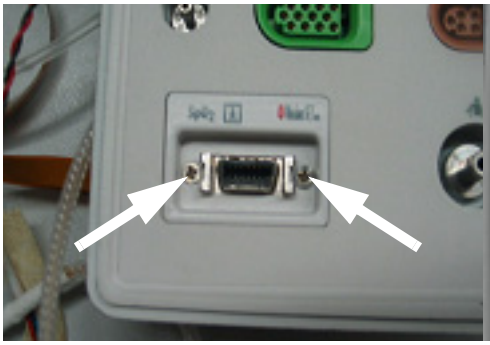


FIGURE 3-16 Masimo SpO_2

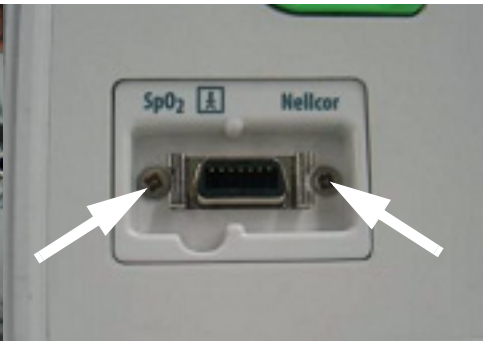


FIGURE 3-17 Nellcor SpO_2

4. Remove the three screws that secure the parameter front panel.
5. Remove the parameter front panel.

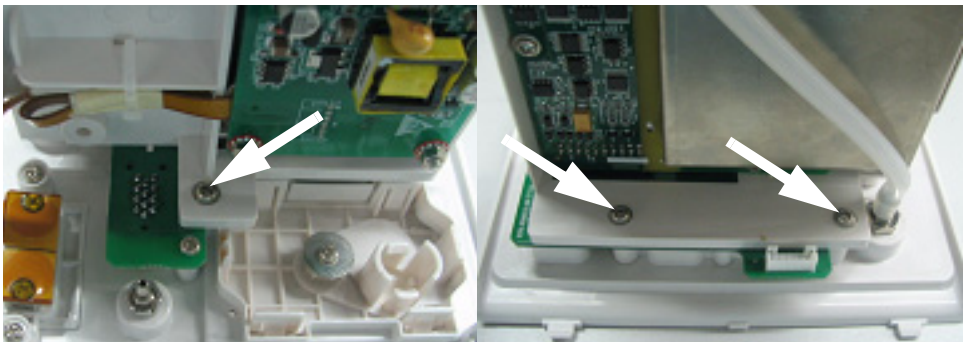


FIGURE 3-18 Remove the parameter front panel

3.5.11 Removal of the Multi-parameter board

1. Remove the parameter front panel assembly as stated in "Removal of the Parameter Front Panel Assembly" on page 3-12.
2. Remove the three screws that secure the multi-parameter board.
3. Remove the multi-parameter board.

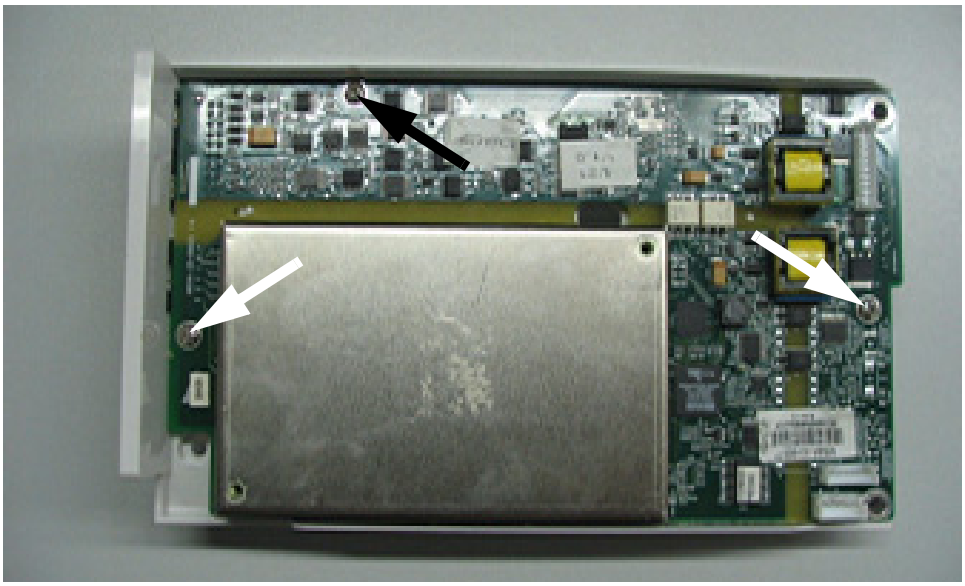


FIGURE 3-19 Remove the multi-parameter board

3.5.12 Removal of the CO_2 Module

1. Remove the multi-parameter board assembly as stated in "Removal of the Multi-parameter Board Assembly" on page 3-10.
2. Remove the two screws that secure the module to the main frame.
3. Remove the CO_2 module.

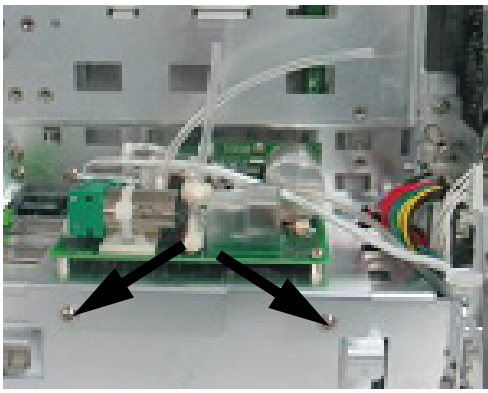


FIGURE 3-20 DPM CO_2

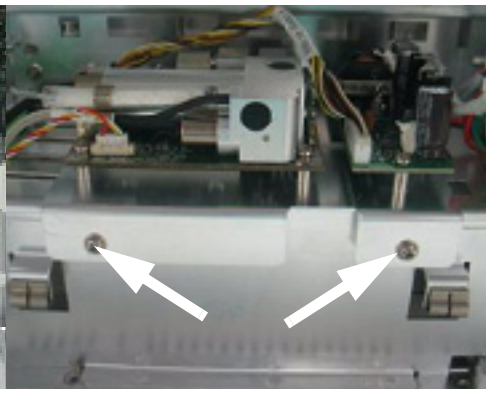


FIGURE 3-21 Microstream CO_2

4. Remove the water trap connector assembly or microstream CO_2 connector fixture assembly from the parameter front panel assembly (if necessary).

3.5.13 Removal of the Masimo SpO_2 Module

1. Remove the multi-parameter board assembly as stated in "Removal of the Multi-parameter Board Assembly" on page 3-10.
2. Disconnect the SpO_2 communication cable from the multi-parameter board.
3. Cut the tie of flexible cable.
4. Unfasten the screw that secures the Masimo SpO_2 module to the multi-parameter board installation frame.
5. Unfasten the two screws that secure the Masimo SpO_2 connector.
6. Remove the Masimo SpO_2 module.

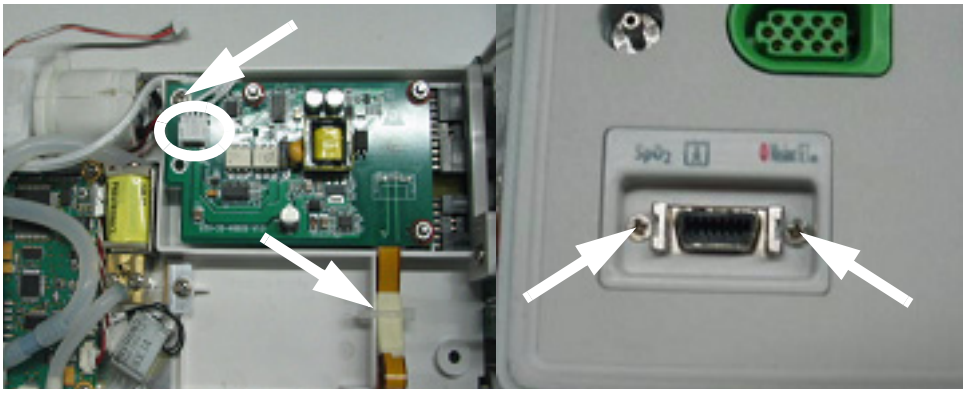


FIGURE 3-22 Remove the Masimo SpO_2 module

3.5.14 Removal of the Nellcor SpO_2 Module

1. Remove the multi-parameter board assembly as stated in "Removal of the Multi-parameter Board Assembly" on page 3-10.
2. Disconnect the SpO_2 communication cable from the multi-parameter board.
3. Cut the tie of flexible cable.
4. Unfasten the screw that secures the Nellcor SpO_2 module to the multi-parameter board installation frame.
5. Unfasten the two screws that secure the Nellcor SpO_2 connector.
6. Remove the Nellcor SpO_2 module.

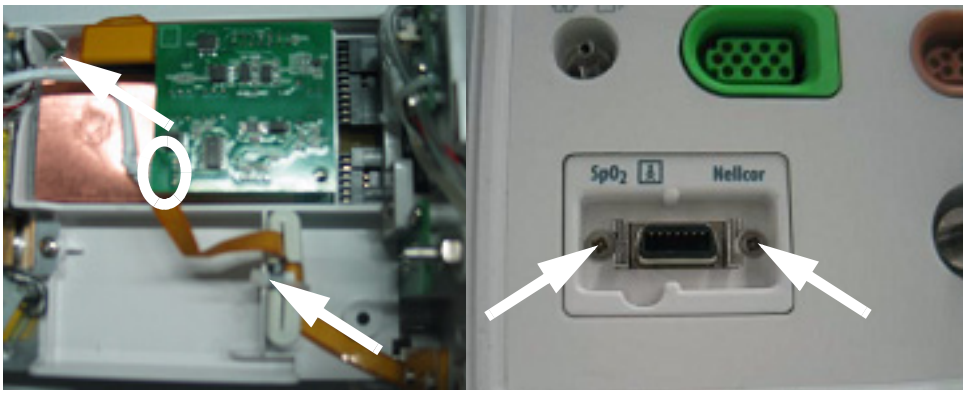


FIGURE 3-23 Remove the Nellcor SpO_2 module

3.5.15 Removal of the NIBP Assembly

1. Remove the multi-parameter board assembly as stated in “Removal of the Multi-parameter Board Assembly” on page 3-10.
2. Unplug the tubing from the NIBP gas nipple.
3. Disconnect the NIBP communication cable from the NIBP board.
4. Unfasten the screws that secure the NIBP assembly to the multi-parameter board installation frame.
5. Remove the NIBP assembly.

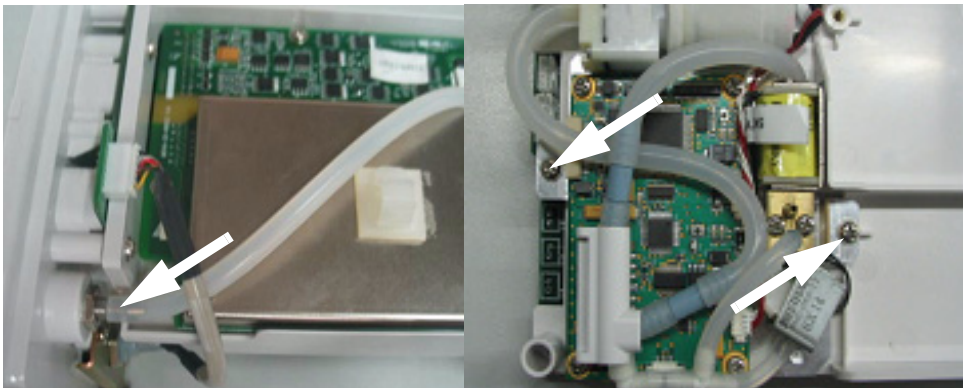


FIGURE 3-24 Remove the NIBP assembly

3.5.16 Removal of the Recorder Assembly

1. Remove the two screws that secure the recorder.
2. Release the two clips and pull out the recorder.

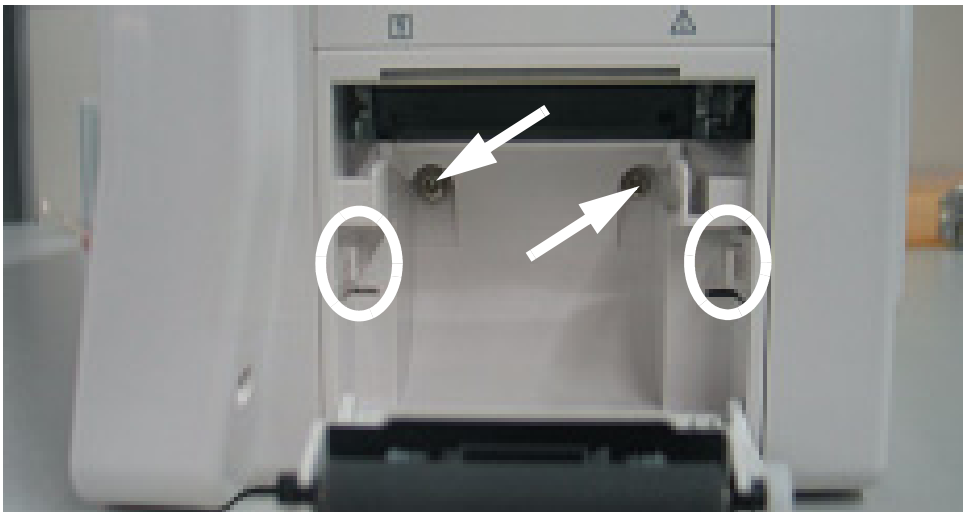


FIGURE 3-25 Remove the recorder assembly

3. Disconnect the recorder cable.
4. Remove the recorder.

3.5.17 Removal of the Recorder Cover (if needed)

1. Pry up the recorder cover with a flat-bladed screwdriver.

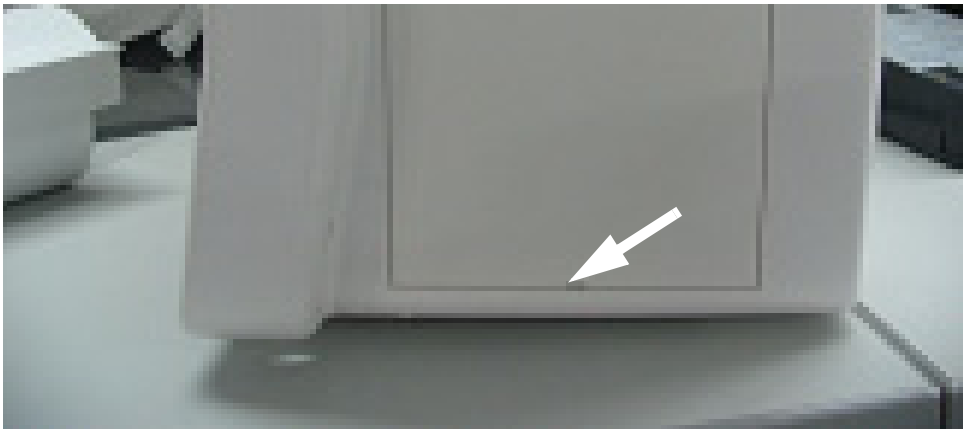


FIGURE 3-26 Remove the recorder cover

3.5.18 Removal of the Main Frame and Multi-parameter Board Assembly

1. Remove the front housing assembly as stated in "Removal of the Front Housing Assembly" on page 3-4.

2. Remove the recorder assembly (if installed) as stated in "Removal of the Recorder Assembly" on page 3-15.

3. Disconnect the power switch cable from the interface board.

4. Remove the eight screws that secure the main frame and multi-parameter board assembly to the rear housing.

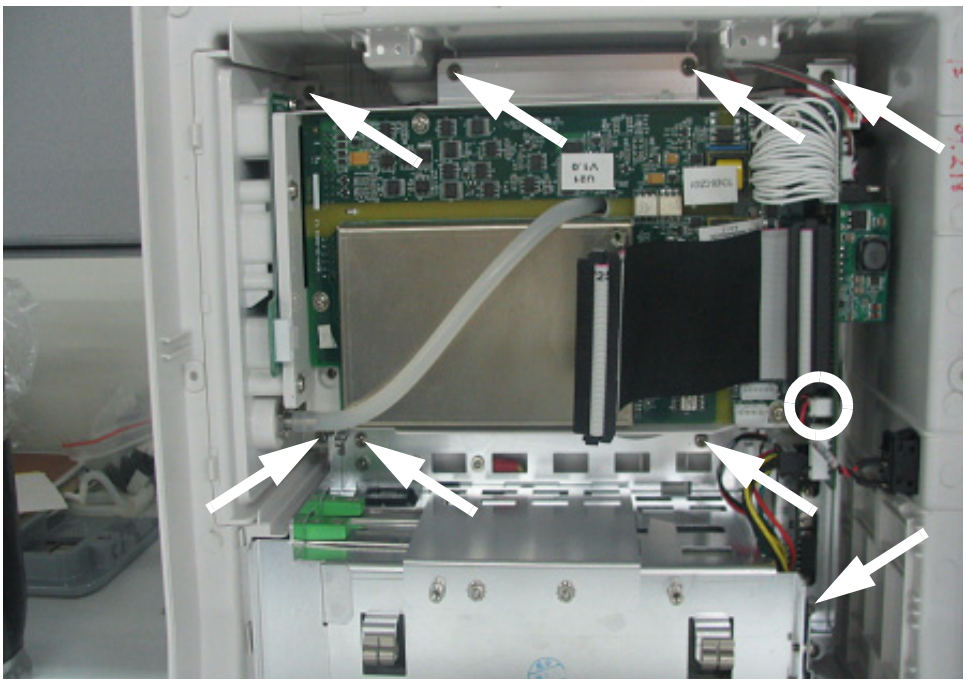


FIGURE 3-27 Remove the screws and cables from the main frame

5. Remove the two screws that secure the main frame from the bottom.
6. Remove the main frame and multi-parameter board assembly.

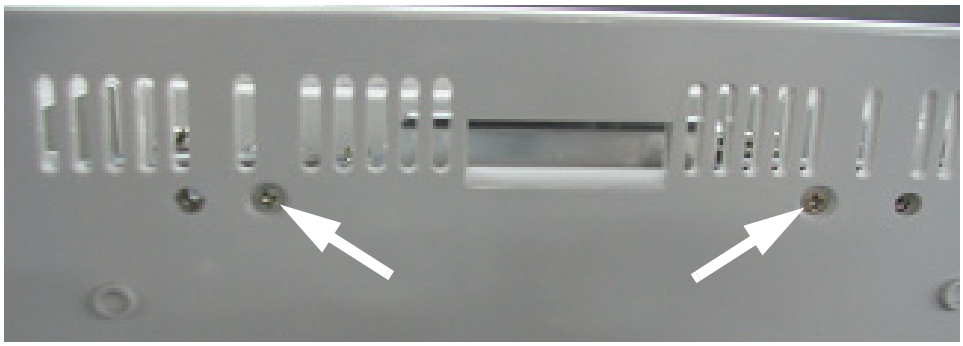


FIGURE 3-28 Remove the main frame and multi-parameter board assembly

3.5.19 Removal of the Speaker Assembly

1. Remove the main frame and multi-parameter board assembly as stated in "Removal of the Main Frame and Multi-parameter Board Assembly" on page 3-16.
2. Cut the clamp that secures the speaker cable.
3. Disconnect the speaker cable from the interface board.

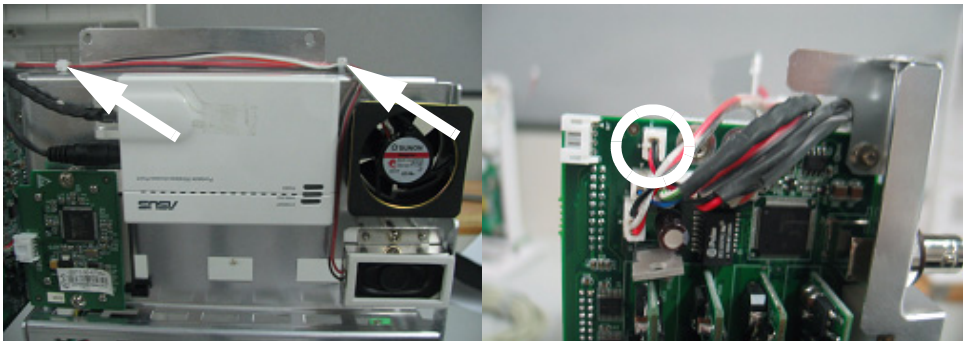


FIGURE 3-29 Disconnect the speaker cable from the interface board

4. Remove the three screws that secure the speaker.
5. Remove the speaker assembly.

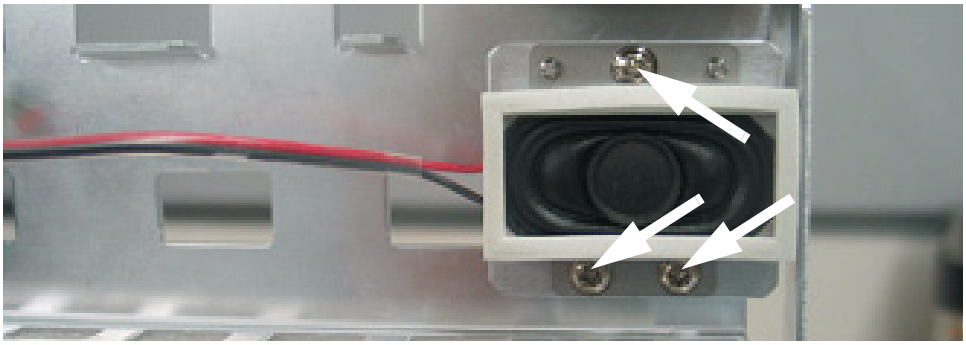


FIGURE 3-30 Remove the speaker assembly

3.5.20 Removal of the Fan Assembly

1. Remove the main frame and multi-parameter board assembly as stated in "Removal of the Main Frame and Multi-parameter Board Assembly" on page 3-16.
2. Cut the clamp that secures the fan cable.
3. Disconnect the fan cable from the interface board.

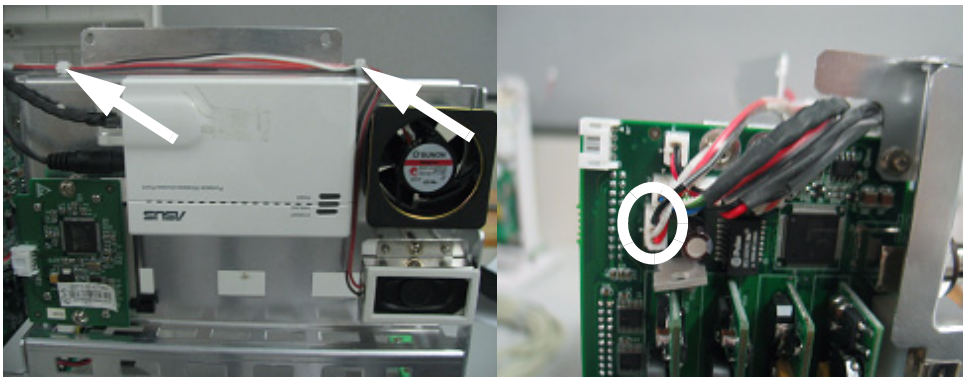


FIGURE 3-31 Disconnect the fan cable from the interface board

4. Remove the fan EVA cushion.
5. Remove the two screws that secure the fan.

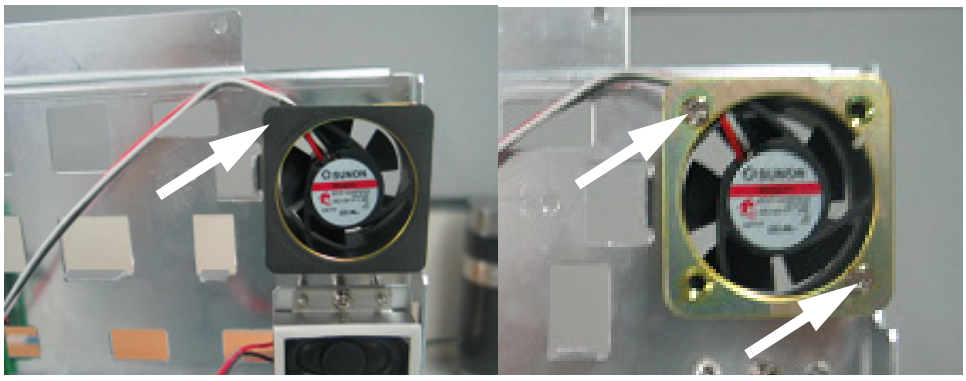


FIGURE 3-32 Remove the fan assembly

6. Remove the fan.

3.5.21 Removal of the CF Card Assembly

1. Remove the main frame and multi-parameter board assembly as stated in "Removal of the Main Frame and Multi-parameter Board Assembly" on page 3-16.
2. Remove the two screws that secure the CF card assembly.
3. Disconnect the CF card cable.
4. Remove the CF card assembly.

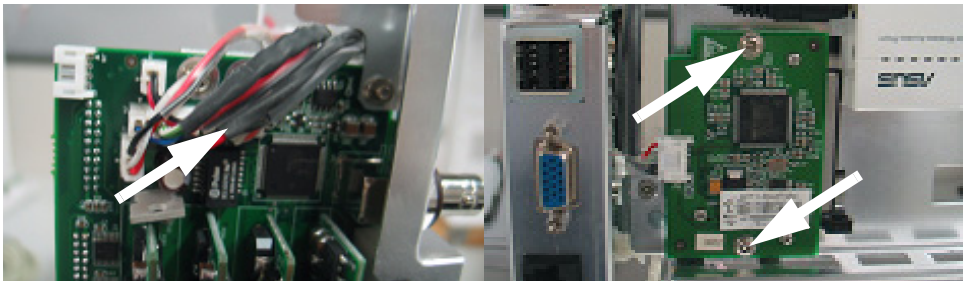


FIGURE 3-33 Remove the CF card assembly

3.5.22 Removal of the Power Board

1. Remove the main frame and multi-parameter board assembly as stated in "Removal of the Main Frame and Multi-parameter Board Assembly" on page 3-16.
2. Remove the two screws that secure the recorder connecting board and then remove the board.

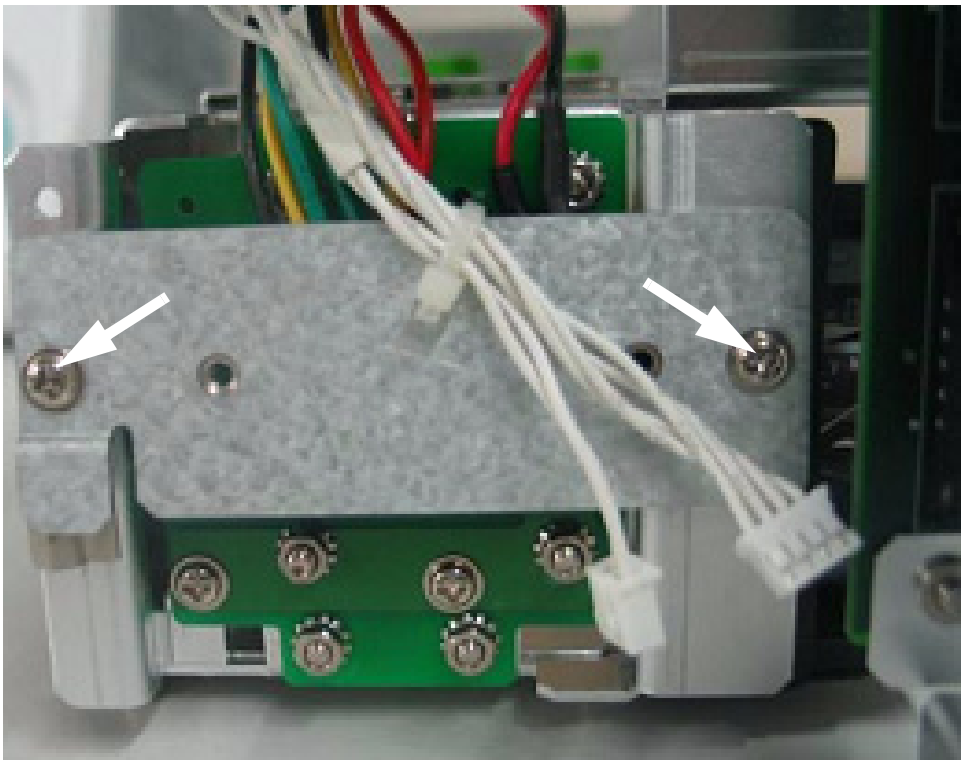


FIGURE 3-34 Remove the screws securing the recorder connecting board

3. Disconnect the power board connecting cable from the interface board.

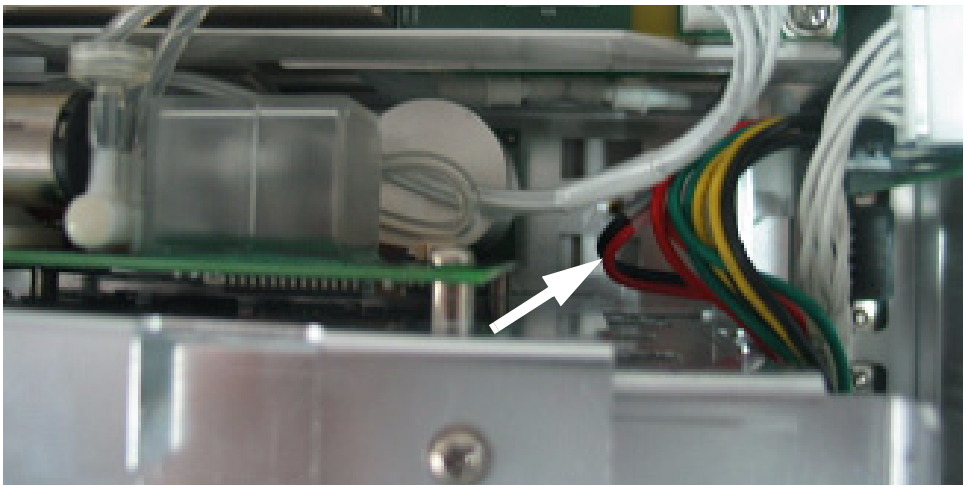


FIGURE 3-35 Disconnect the power board connecting cable

4. Remove the three screws that secure the power socket support from the back of the main frame.

5. Remove the screw that secures the grounding wire.

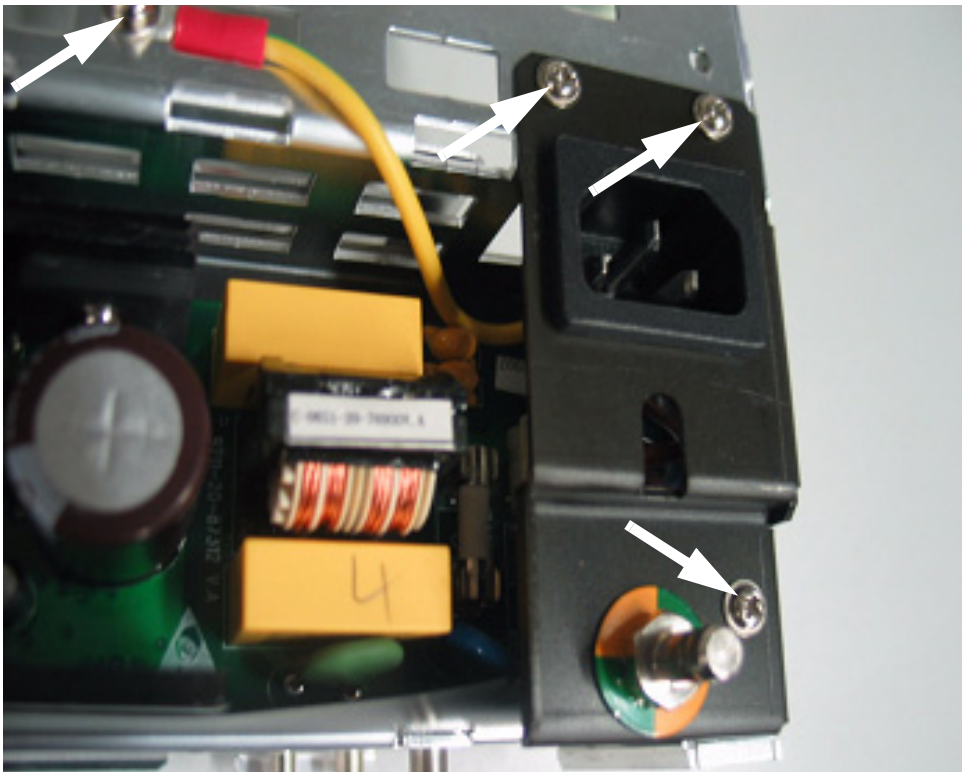


FIGURE 3-36 Remove the screws that secure the power socket

6. Disconnect the power socket cable from the power board.
7. Remove the four screws that secure the power board.
8. Remove the power board.

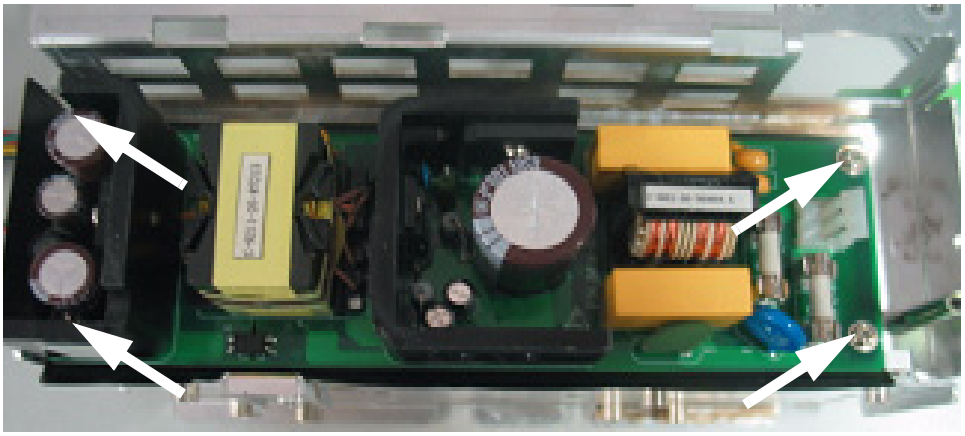


FIGURE 3-37 Remove the power board

3.5.23 Removal of the Li-ion Battery Interface Board Assembly

1. Remove the front housing assembly as stated in “Removal of the Front Housing Assembly” on page 3-4.
2. Remove the recorder assembly (if installed) as stated in “Removal of the Recorder Assembly” on page 3-15.
3. Remove the two screws that secure the recorder connecting board and then remove the board.

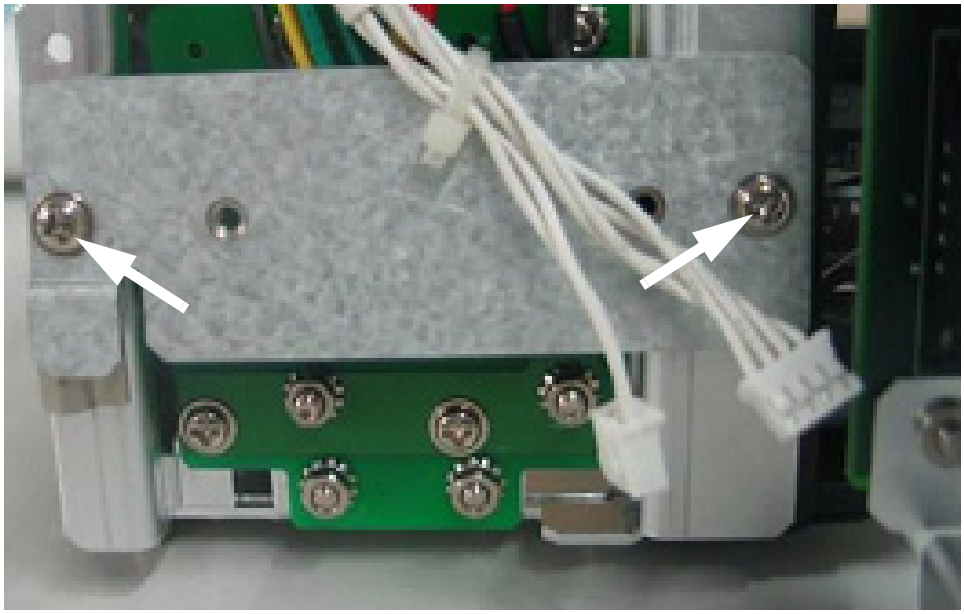


FIGURE 3-38 Remove the screws securing the recorder connecting board

4. Disconnect the Li-ion battery interface board cable from the interface board.

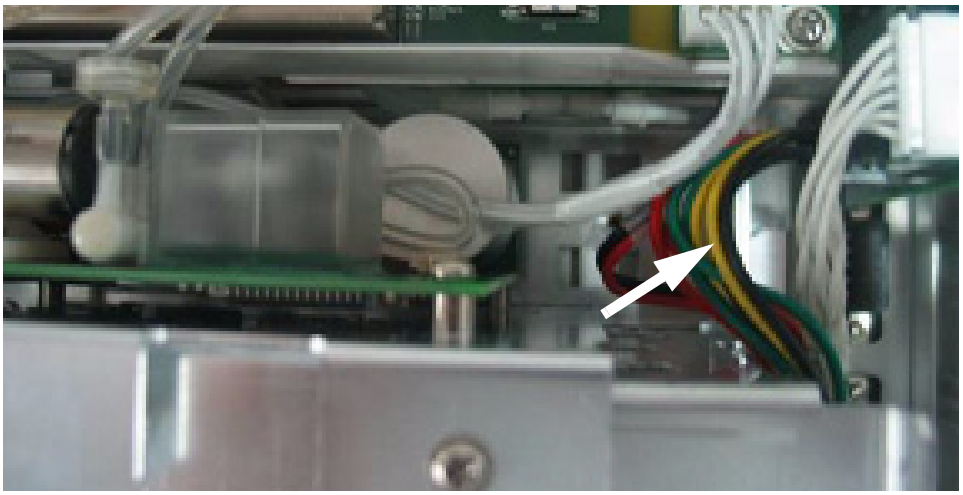


FIGURE 3-39 Disconnect the Li-ion battery interface board cable

5. Remove the four nuts that secure the Li-ion battery interface board assembly.

6. Remove the Li-ion battery interface board assembly.

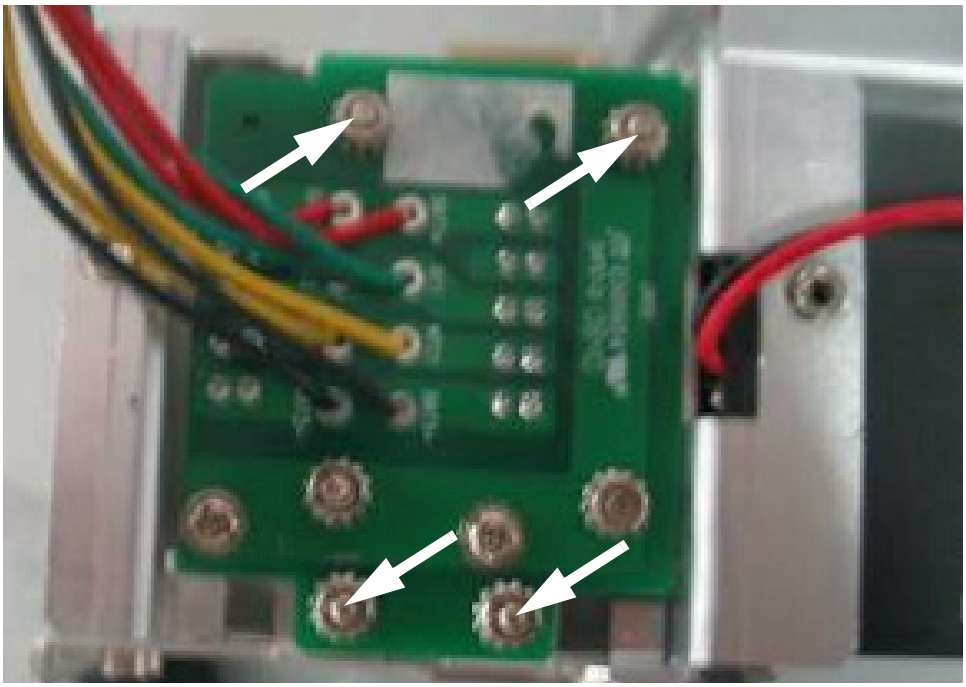


FIGURE 3-40 remove the Li-ion battery interface board assembly

3.5.24 Removal of the Interface Board Assembly

1. Remove the multi-parameter board assembly as stated in “Removal of the Multi-parameter Board Assembly” on page 3-10.
2. Remove the recorder assembly (if installed) as stated in “Removal of the Recorder Assembly” on page 3-15.
3. Disconnect the power switch cable from the interface board.
4. Remove the six screws that secure the main frame to the rear housing.

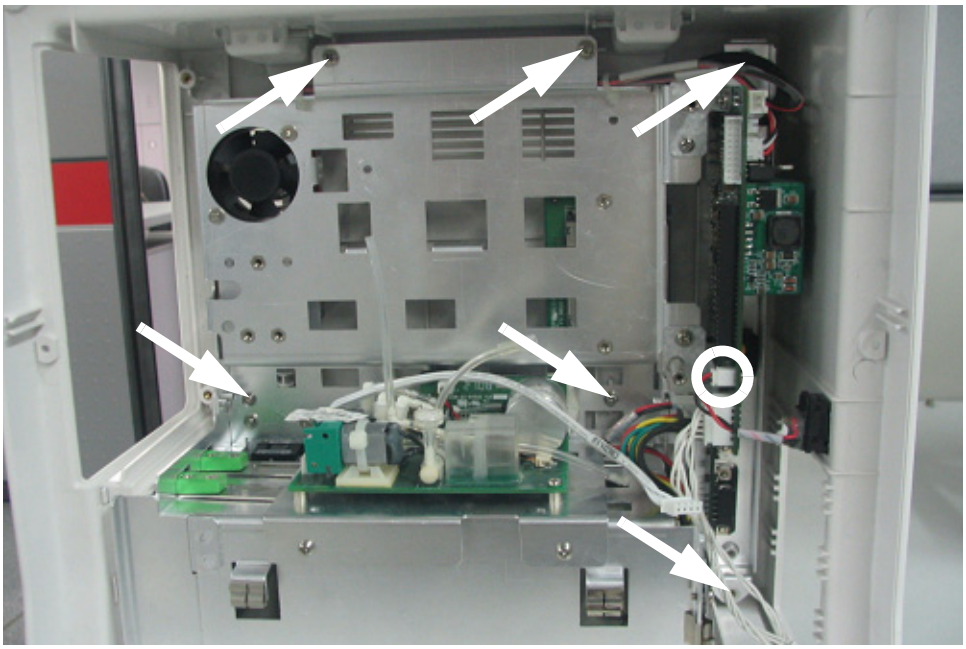


FIGURE 3-41 Remove the screws from the main frame

5. Remove the two screws that secure the main frame from the bottom.
6. Remove the main frame assembly and place to the side.

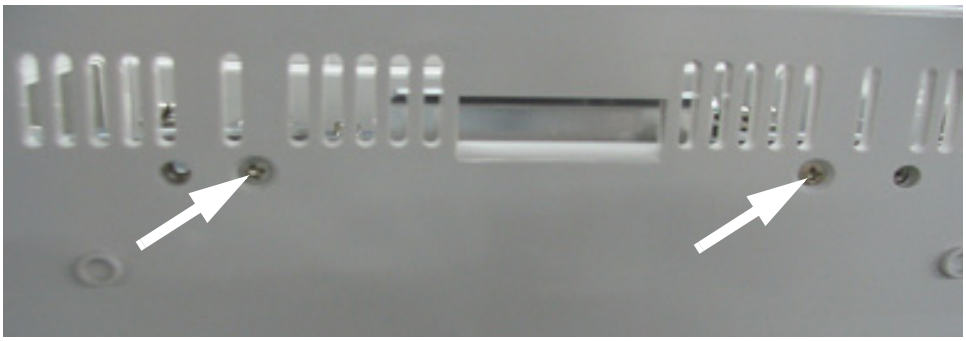


FIGURE 3-42 Remove the screws securing the main frame

7. Disconnect the Li-ion battery interface board cable from the interface board.
8. Disconnect the power cable from the interface board.
9. Disconnect the recorder cable from the interface board.

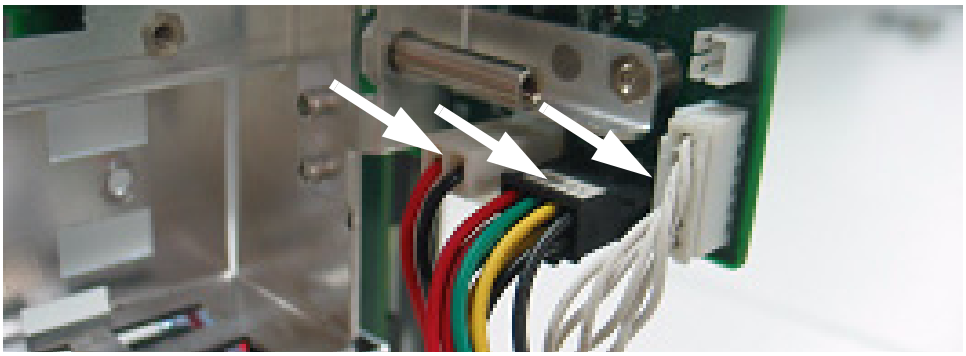


FIGURE 3-43 Disconnect the cables from the interface board

10. Disconnect the speaker cable from the interface board.

11. Disconnect the fan cable from the interface board.

12. Disconnect the CF card cable from the interface board.

13. Disconnect the wireless AP (if installed) cable from the interface board.

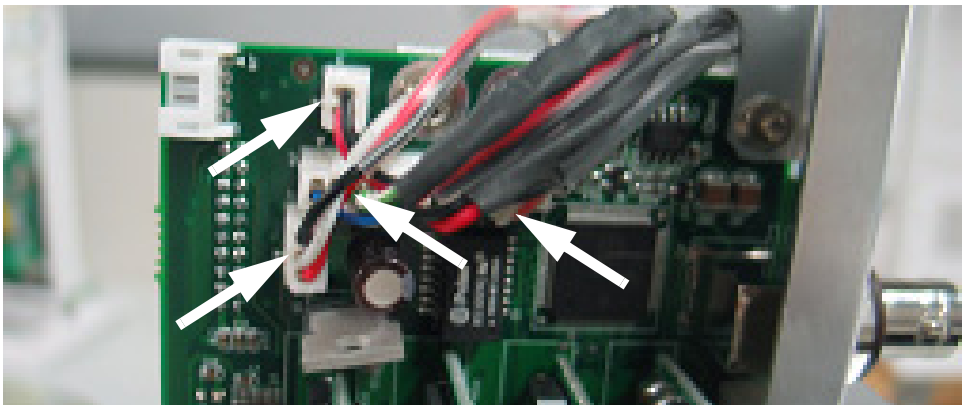


FIGURE 3-44 Disconnect the cables from the interface board

14. Remove the two screws that secure the interface board assembly to the main frame.

15. Remove the interface board assembly.

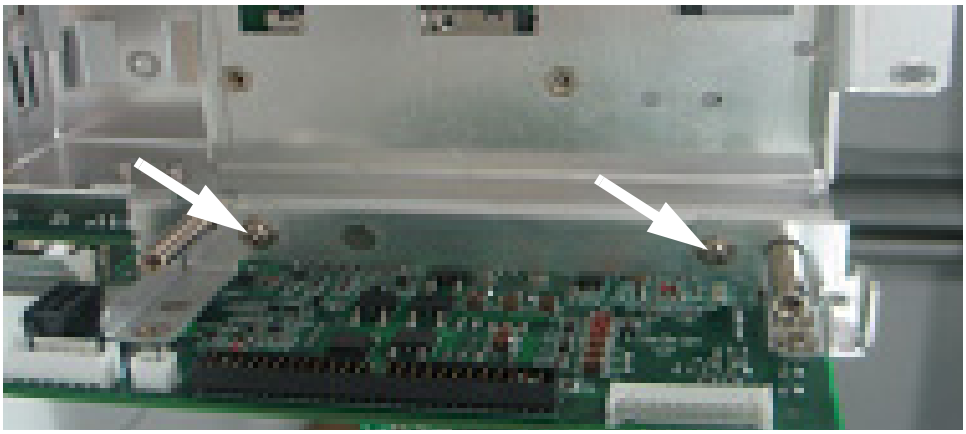


FIGURE 3-45 Remove the interface board assembly

3.5.25 Removal of the Wireless AP

1. Remove the multi-parameter board assembly as stated in "Removal of the Multi-parameter Board Assembly" on page 3-10.
2. Remove the recorder assembly (if installed) as stated in "Removal of the Recorder Assembly" on page 3-15.
3. Disconnect the power switch cable from the interface board.
4. Remove the six screws that secure the main frame to the rear housing.

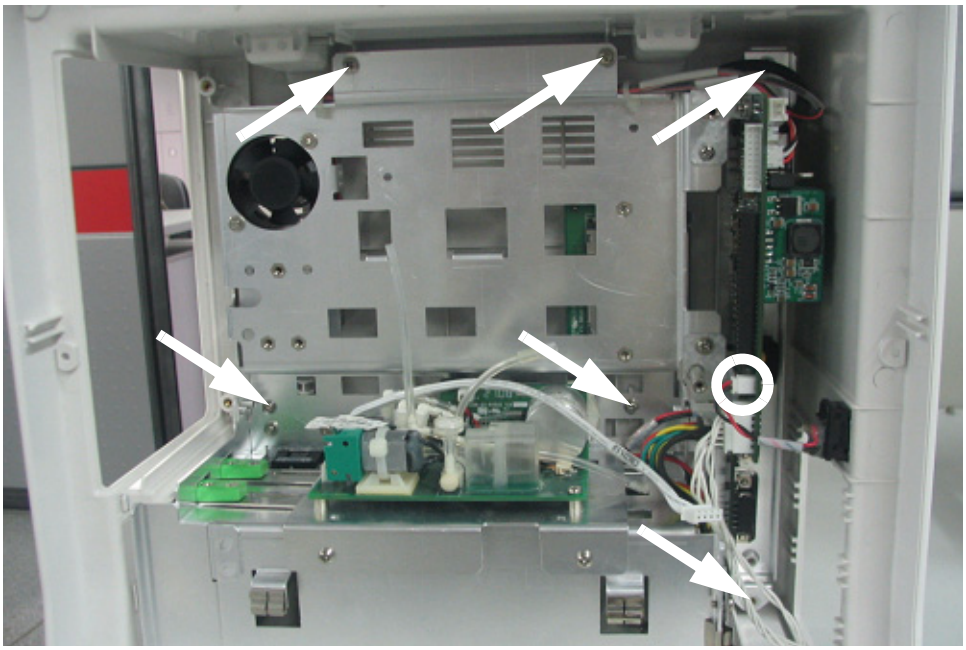


FIGURE 3-46 Remove the screws from the main frame

5. Remove the two screws that secure the main frame from the bottom.
6. Remove the main frame assembly.

FIGURE 3-47 Remove the screws securing the main frame

7. Remove the nut that secures the wireless AP to the main frame.

FIGURE 3-48 Remove the nut securing the wireless AP to the main frame

8. Disconnect the wireless AP cable from the wireless AP.

9. Remove the wireless AP.

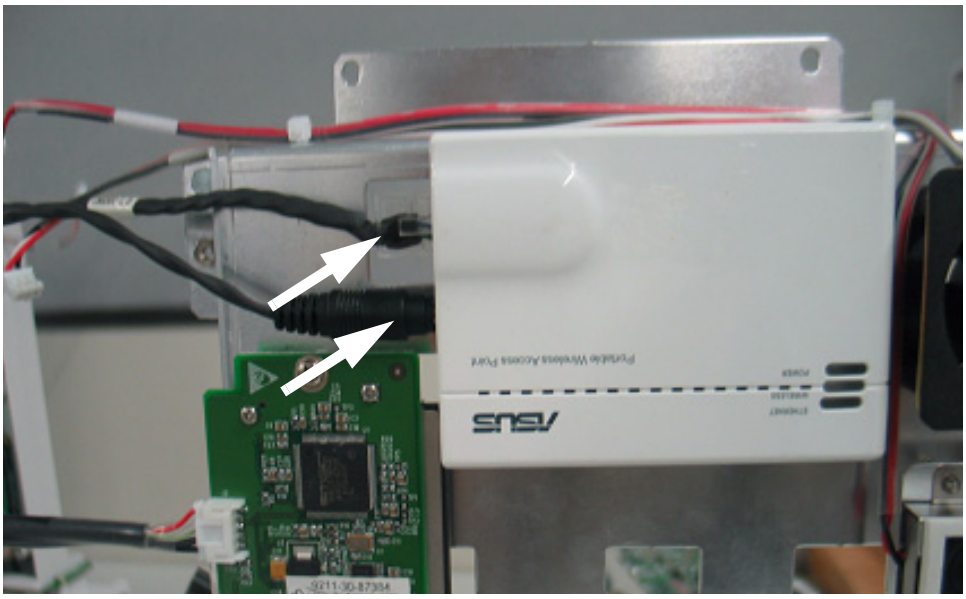


FIGURE 3-49 Disconnect the cables from the wireless AP

3.6 Nurse Call Cable

3.6.1 P/N 8000-21-10361

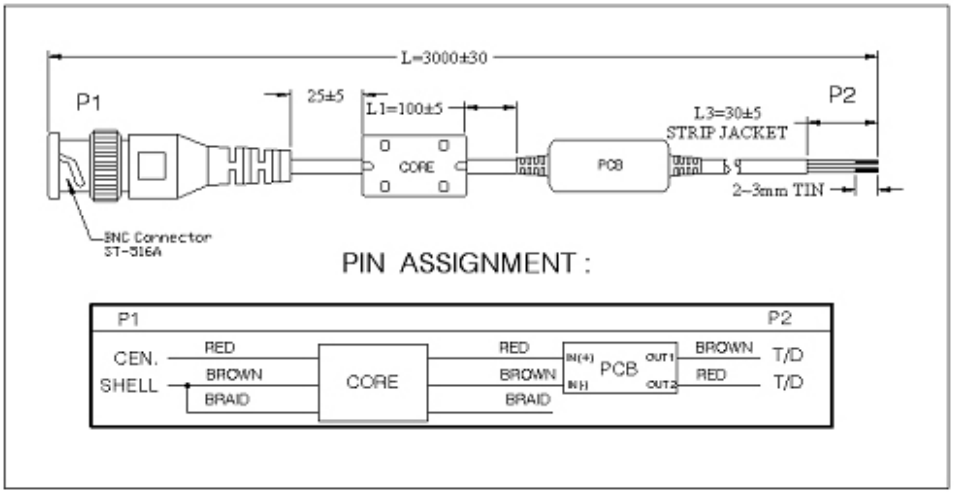


FIGURE 3-50 Nurse Call Cable

3.7 Analog Output Cable

3.7.1 P/N 6100-20-86360

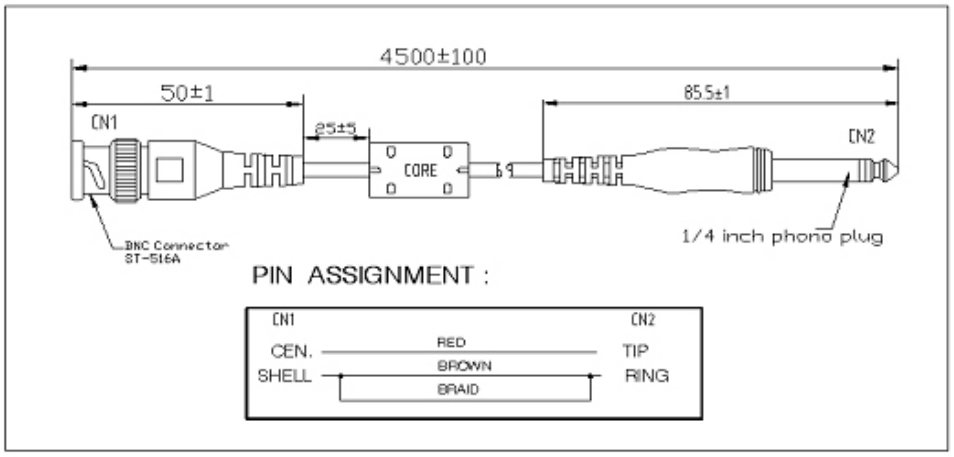


FIGURE 3-51 Analog Output Cable

3.8 Defib Synch Cable

3.8.1 P/N 6100-20-86361

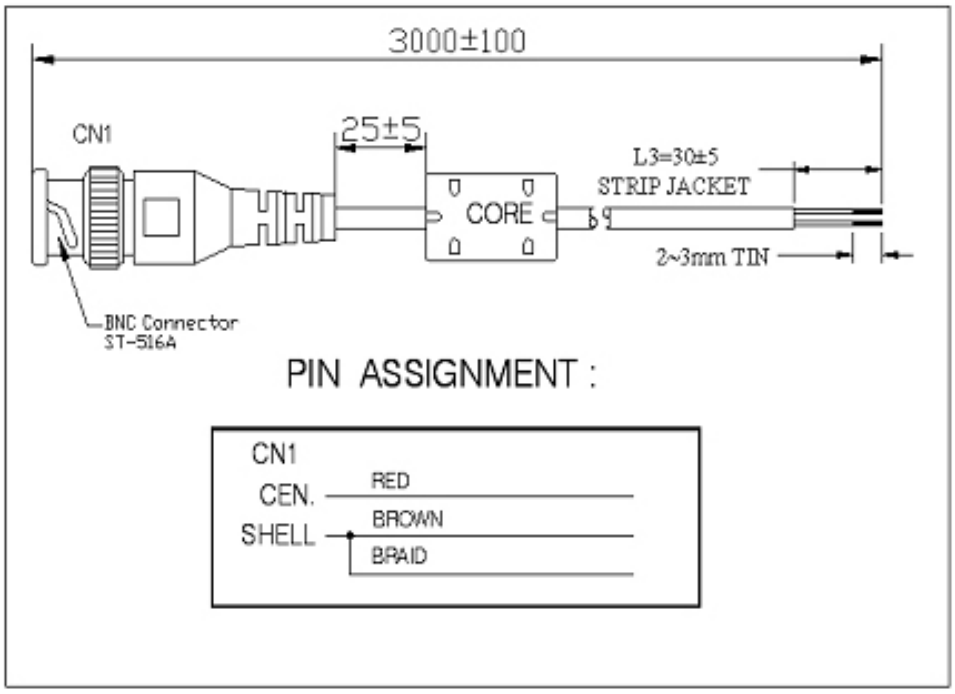


FIGURE 3-52 Defib Synch Cable

3.9 Serial Port to Gas Module 3 Cable

3.9.1 P/N 0012-00-1276-XX

DESCRIPTION	DASH NUMBER
12" 9-pin mini-D serial to 25-pin D-shell	-01
72" 9-pin mini-D serial to 25-pin D-shell	-02

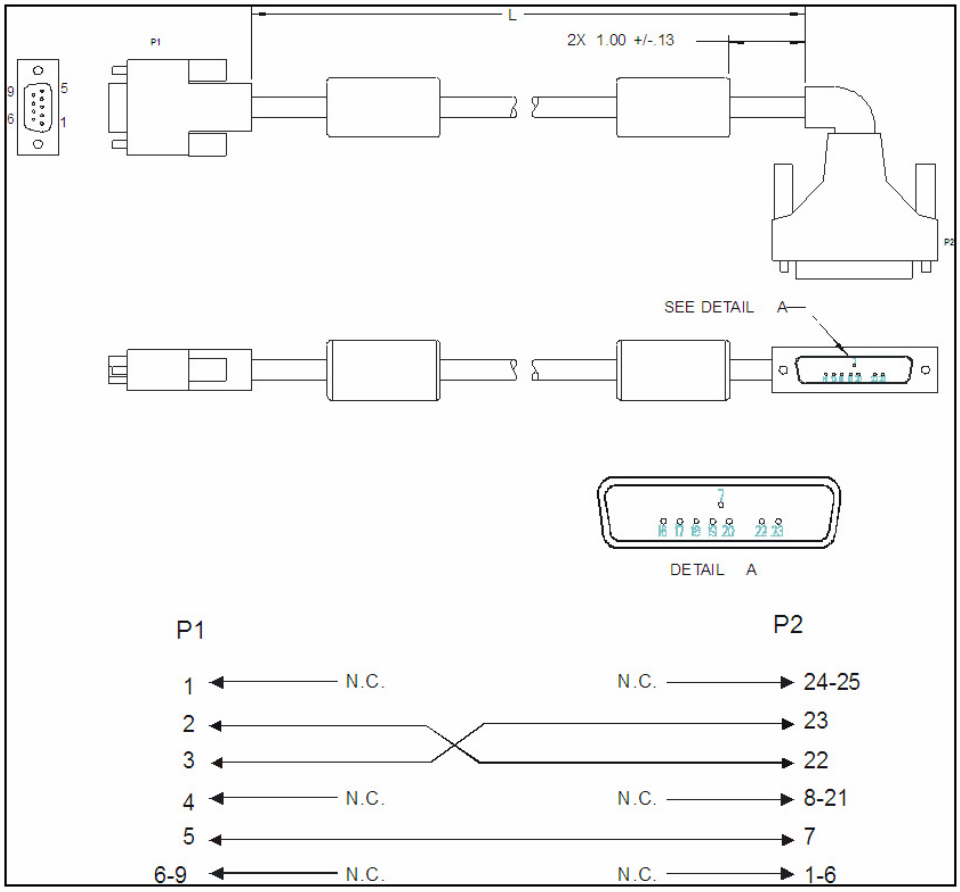


FIGURE 3-53 Serial Port to Gas Module 3 Cable

3.10 Null Modem Cable

3.10.1 P/N 0012-00-1275-01

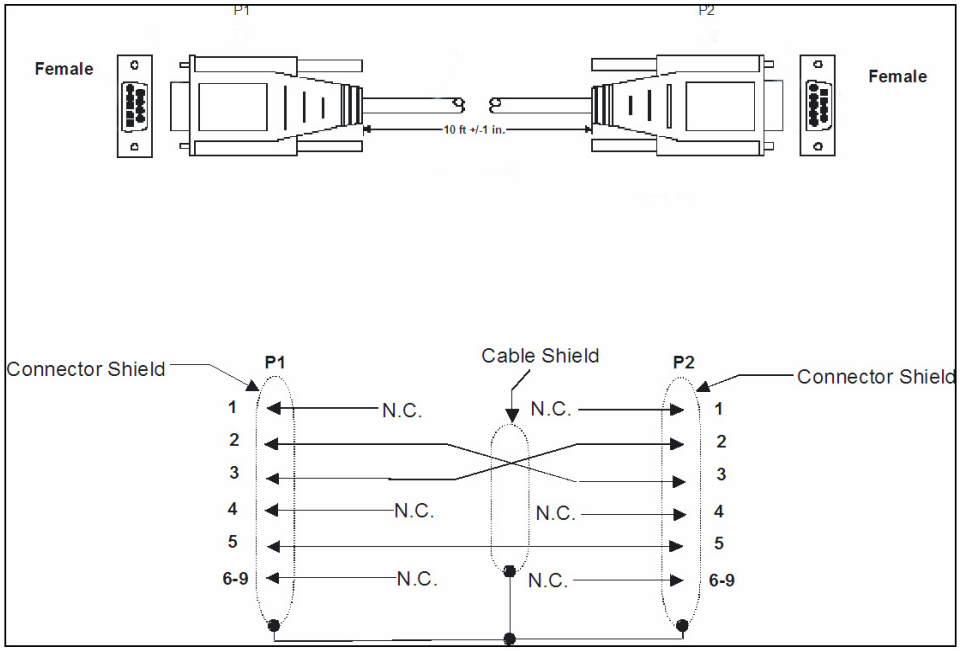


FIGURE 3-54 Null Modem Cable

3.11 Universal ECG Lead Wires

3.11.1 P/N 0012-00-1503-XX

	DESCRIPTION	DASH #
10	24", snap, 5-lead set, Domestic	-02
11	24", snap, 3-lead set, Domestic	-05
12	24", snap, 5-lead set, International	-11
13	24", snap, 3-lead set, International	-14

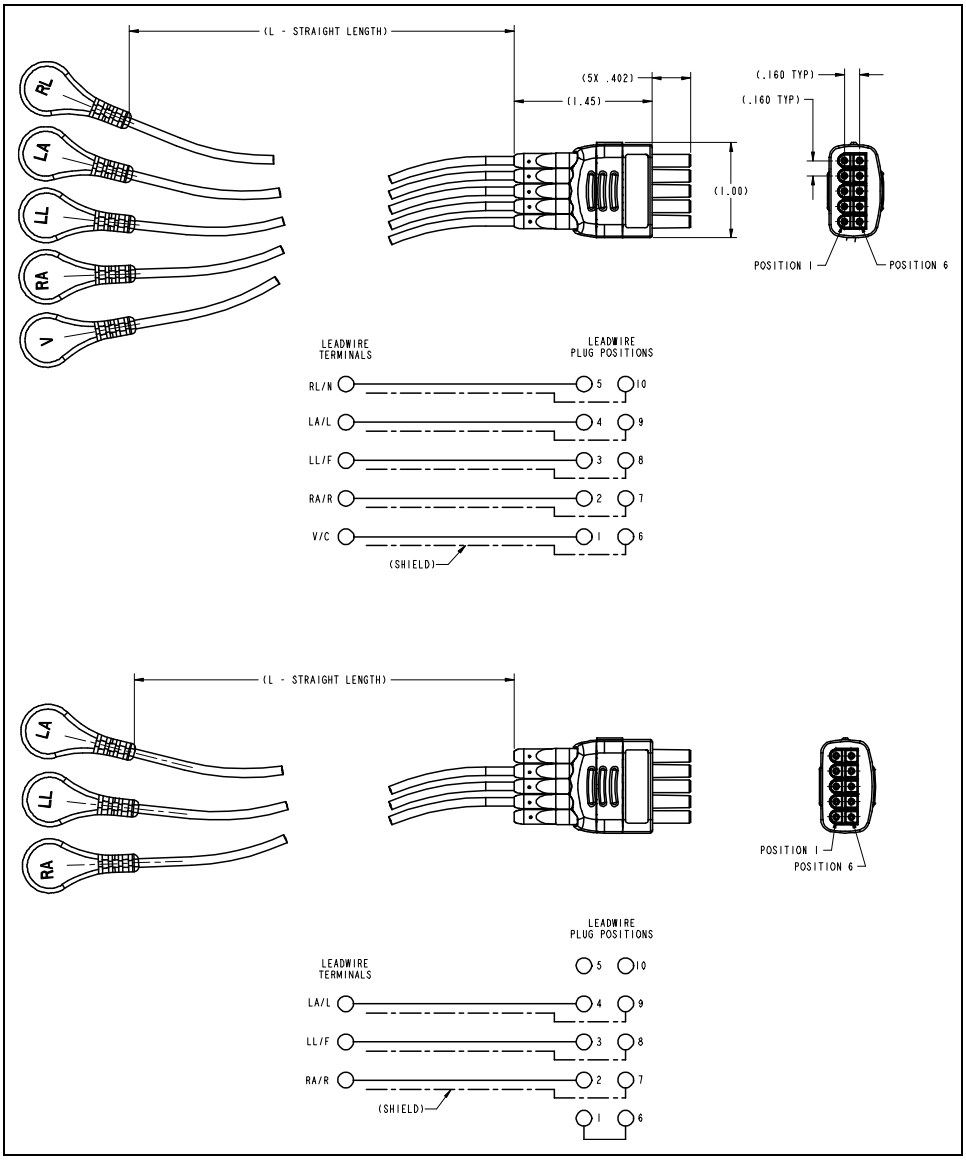


FIGURE 3-55 Universal ECG Lead Wires

3.12 ECG Cable, 3/5-lead (ESIS and Non ESIS)

3.12.1 P/N 0012-00-1745-XX

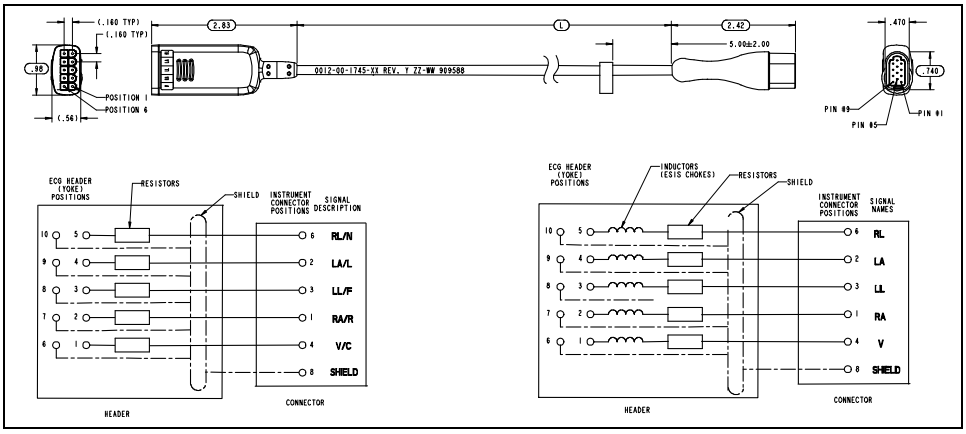


FIGURE 3-56 ECG Cable, 3/5-lead (ESIS and Non ESIS)

3.13 12-pin 3-lead Neo ECG Trunk Cable (IEC/AHA)

3.13.1 P/N 040-000072-00

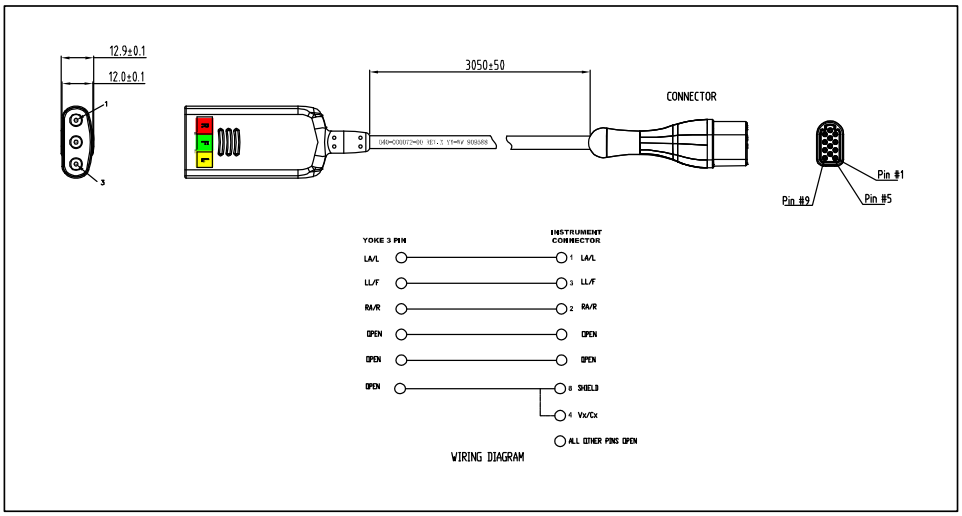


FIGURE 3-57 12-pin 3-lead Neo ECG Trunk Cable (IEC/AHA)

3.14 IBP Cable

3.14.1 P/N 040-000052-00

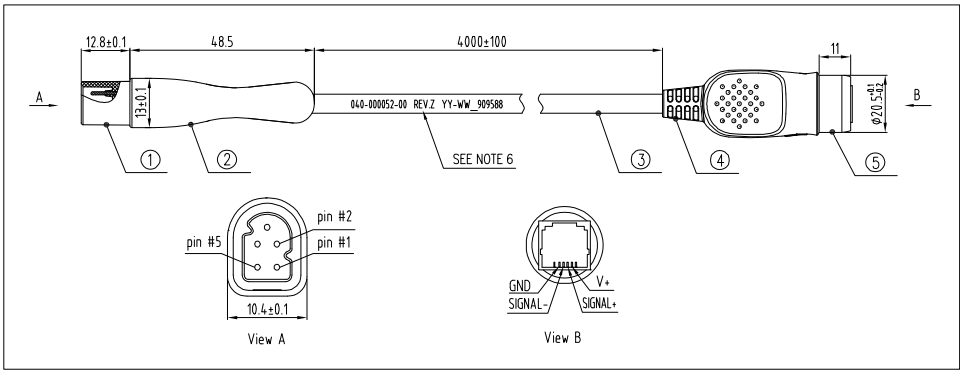


FIGURE 3-58 5-pin IBP Cable (IM2301, Hospira)

3.14.2 P/N 040-000053-00

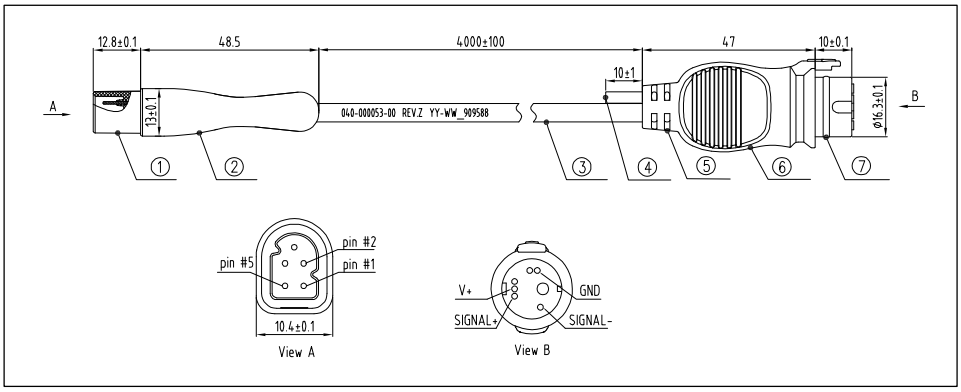


FIGURE 3-59 5-pin IBP Cable (IM2302, BD)

3.14.3 P/N 040-000054-00

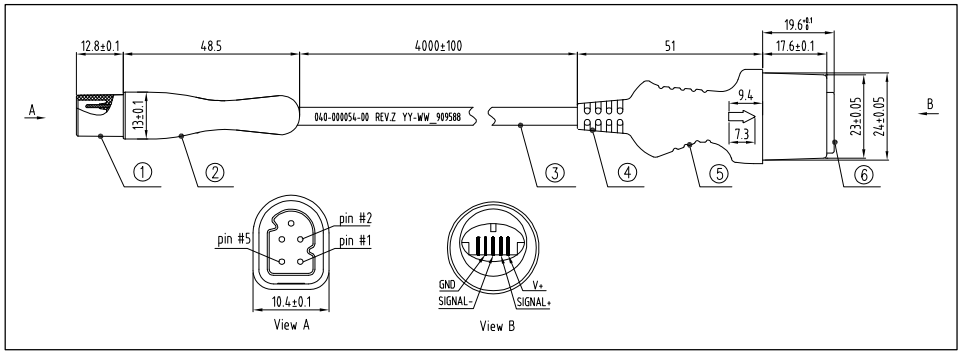


FIGURE 3-60 5-pin IBP Cable (IM2303, Edwards)

3.14.4 P/N 040-000096-00

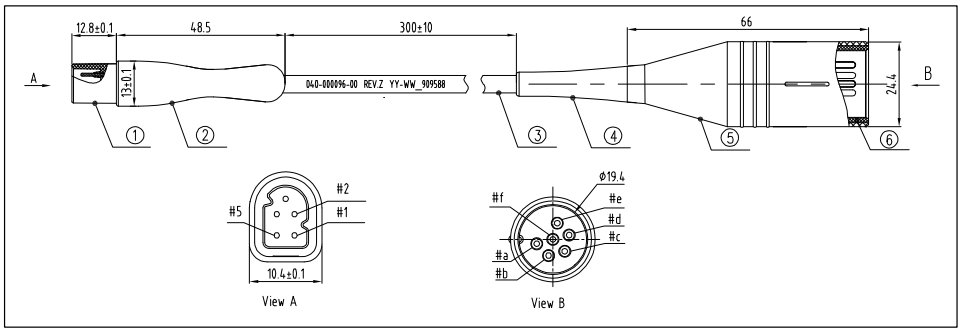


FIGURE 3-61 IBP Adapter Cable (5-pin to 6-pin)

3.15 Temperature Cable

3.15.1 1.15.1 P/N 040-000055-00

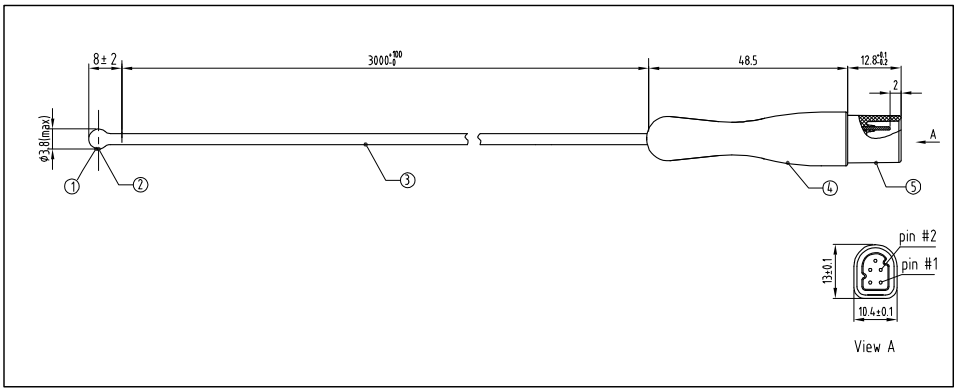


FIGURE 3-62 5-pin Esophageal/Rectal Temp Probe (Adult)

3.15.2 P/N 040-000056-00

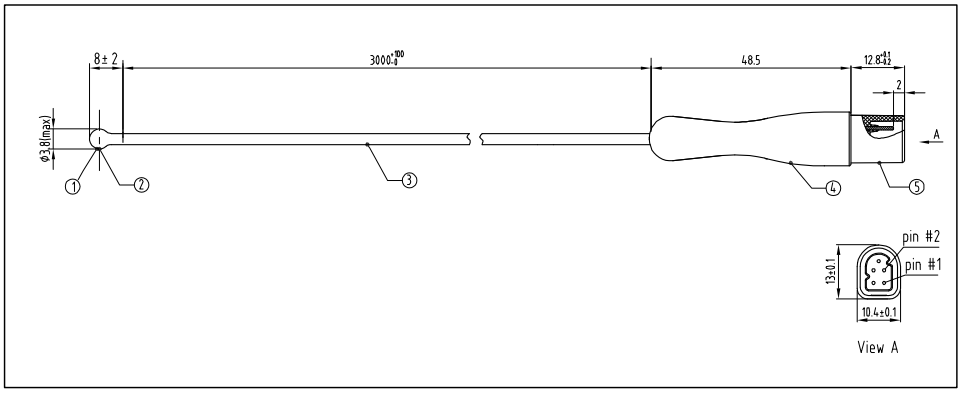


FIGURE 3-63 5-pin Esophageal/Rectal Temp Probe (Pediatric/Infant)

3.15.3 P/N 040-000057-00

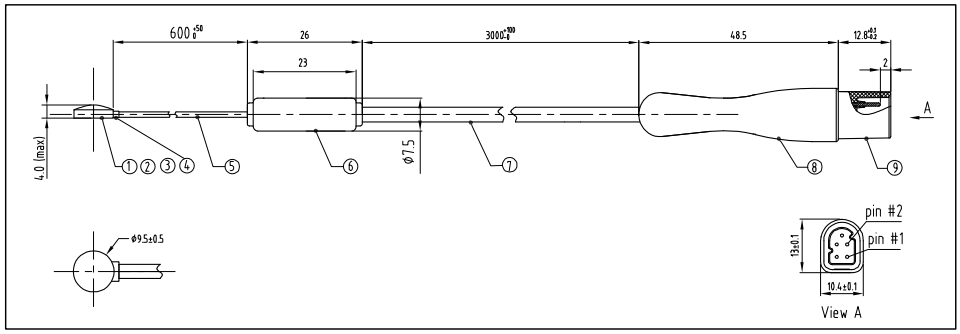


FIGURE 3-64 *5-pin Skin Temp Probe (Adult)*

3.15.4 P/N 040-000058-00

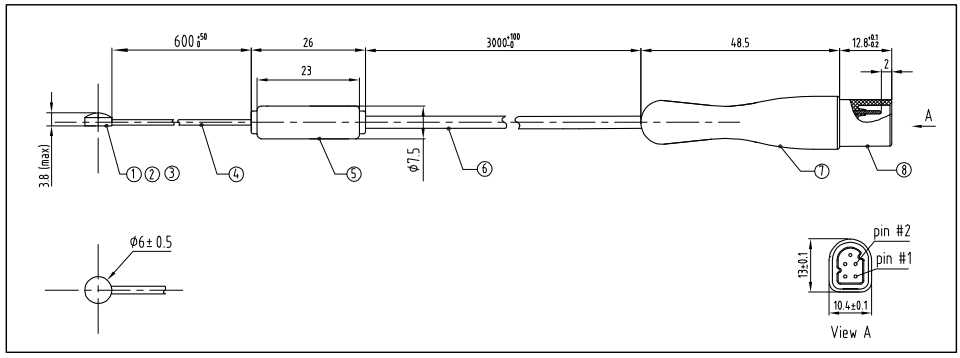


FIGURE 3-65 *5-pin Skin Temp Probe (Pediatric/Infant)*

3.15.5 P/N 040-000091-00

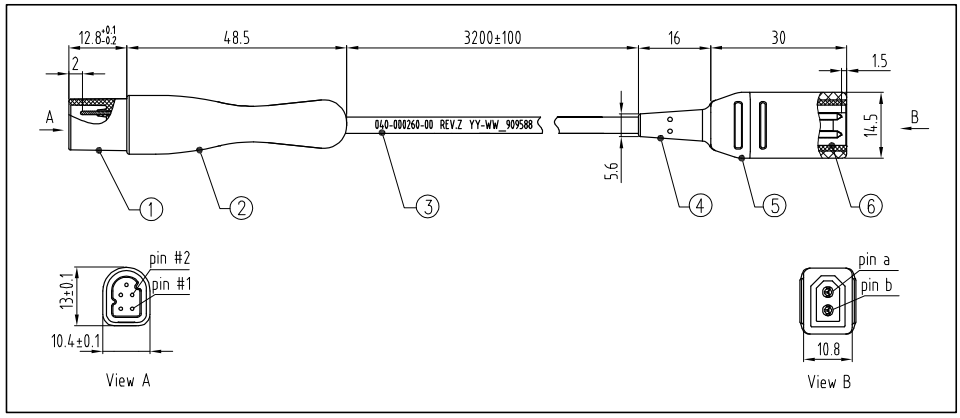


FIGURE 3-66 *5-pin Temp Cable for 400 Series Disposable Sensor*

3.15.6 P/N 040-0000100-00

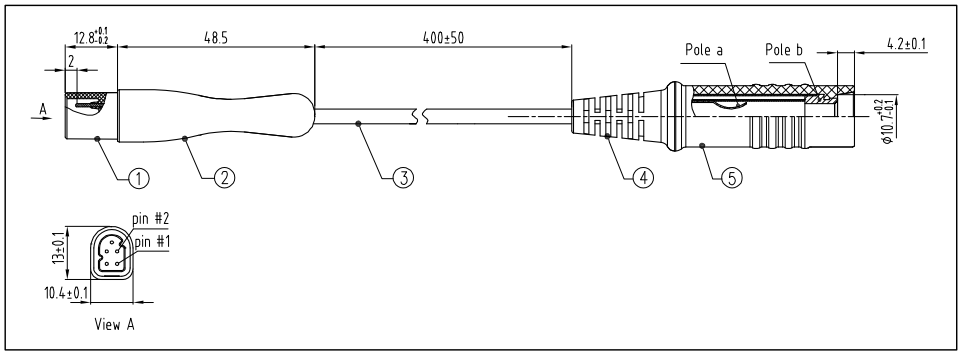


FIGURE 3-67 5-pin Temp Adapter Cable (5-pin to 6.35 Phone)

3.15.7 P/N 040-000224-00

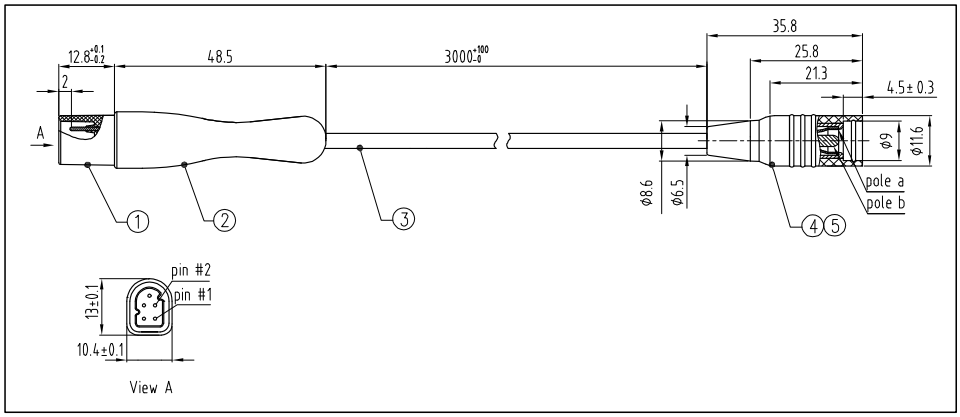
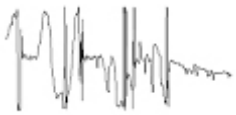
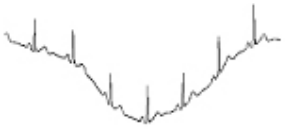


FIGURE 3-68 5-pin Temp Cable for MRS Disposable Sensor (5.5 DC Jack)

3.16 Troubleshooting Menus

3.16.1 ECG Troubleshooting

MESSAGE/PROBLEM	REASON		SOLUTION	
Noisy ECG traces 	1 2 3	Loose or dry electrodes. Defective electrode wires. Patient cable or leads are routed too close to other electrical devices.	1 2 3	Apply fresh, moist electrodes. Replace wires as necessary. Eliminate 60Hz interference.
Excessive Electro-surgical Interference	1	Wrong ECG cable used.	1	Use ESIS ECG cable with internal filter block. **NOTE: Respiration monitoring via the ECG electrodes will not be available when using an ESIS ECG cable.**
Muscle Noise	1	Inadequate skin preparation prior to application of electrode, tremors, tense subject, and/or poor electrode placement.	1 2 3	Repeat skin preparation and electrode location procedures. Apply fresh, moist electrodes. Avoid areas of the torso that are very muscular.
Excessive alarms: heart rate, lead fault	1 2 3 4	Electrodes dry Alarm limits set too close to patient's normal heart rate. R-wave wrong size. Excessive patient movement or muscle tremor.	1 2 3 4	Re-prep skin and apply fresh, moist electrodes. Readjust. Must have a higher amplitude than the other ECG waves, like the P and T waves. Reposition electrodes and secure with tape, if necessary.
ECG Noise	1 2	External interference. Patient movement.	1 2 3	Check patient. Check electrode contacts /reposition electrodes/ cable. Check environment for source of interference.
No ECG Waveform	1 2 3	Gain set too low. Lead wires and patient cable not fully or properly inserted. Cable or lead wires damaged.	1 2 3	Readjust as required (Set via the **Size** key). Check for proper insertion. Check with lead continuity tester.

MESSAGE/PROBLEM	REASON		SOLUTION	
Base Line Wander 	1 2 3 4	Patient moving excessively. Patient's respiration. Electrodes dry or loose. Static build up around patient. ECG Filter set to "ST" or "Diagnose" mode.	1 2 3 4 5	Secure lead wires and cable to patient. Reposition electrodes. Re-prep skin and apply fresh, moist electrodes. Check with local biomedical personnel. Set ECG Filter to "Monitor" mode.
ECG Artifact	1 2	Electrical interference from auxiliary devices. Patient movement.	1 2 3	Check patient. Check Electrode Contacts /reposition electrodes/ cable. Check for electrical interference, replace wires as necessary.
Self Test Error	1	During power-on of the unit, if ECG module can not self-test successfully, this message will display.	1	Power cycle unit. If message reappears, contact Technical Support.
Communication Stop	1	As the ECG module communication stops, the data packets sent by the module can not be received.	1	Contact Technical Support.
Communication Error	1	The ECG module communication error. The command can not be sent correctly.	1	Contact Technical Support.
ESU-Resp Off	1	The high frequency electrosurgery unit interference signal is detected.	1	Wait until the high frequency electrosurgery unit interference disappears.
ECG Signal Invalid	1 2 3	Connections not tight or properly secured. Electrodes dry or loose. Cable or lead wires damaged.	1 2 3	Ensure proper connection. (Electrode to lead, lead to cable, cable to monitor). Re-prep skin and apply fresh, moist electrodes. Check with continuity tester.
Pacer Rejection On	1	When Pacer Reject is set to On.	1	This is normal operation. When Pace Reject is set to Off, this message disappears.
Learning	1	Displayed when a learning cycle has been requested for Arrhythmia or ST.	/	
No Arrhythmia Detection at Central	1	Central Station does not have arrhythmia Analysis capability.	/	

MESSAGE/PROBLEM	REASON		SOLUTION	
ECG Channels Checking...	1	Appears when the ECG Module is calibrating.	1	This is normal operation. Turn off ECG module calibration and the message will be cleared.
Initialization Error	1	During the ECG module power-on, as the ECG module communication stops, system fails to communicate with module.	1	Contact Technical Support.

3.16.2 NIBP Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
NIBP: Self Test Error	1 2	Failed self-test. Sensor or A/D sampling may have error.	1	Power cycle unit. If message reappears, contact Technical Support.
NIBP: Communication Error	1	NIBP module communication error. The command can not be sent correctly.	1	Power cycle unit. If message reappears, contact Technical Support.
NIBP: System Error	1 2	System error. After start-up, the inflating pump, A/D sampling unit or pressure sensor may have error or the pointer may have error when the software is running. Power supply is not stable or circuit failure leads to voltage error.	1	Power cycle unit. If message reappears, contact Technical Support.
NIBP: Cuff Overpressure	1 2	The hardware overpressure limit has been exceeded. Overpressure. The cuff pressure exceeds 297 mmHg in ADU mode, 240 mmHg in PED mode or 147 mmHg in NEO mode.	1	Power cycle unit.If message reappears, contact Technical Support.
NIBP: Pneumatic Leak	1	Leakage. In Pneumatic check, air leakage is found in hose.	1	Change the cuff.
NIBP: Unable to Measure	1	Unable to make measurement after three automatic retries.	1 2	Check Patient. Retry measurement. If message reappears, power cycle unit. If message reappears, contact Technical Support.
NIBP: Reset Failed	1	Reset failed.	1	Power cycle unit.If message reappears, contact Technical Support.

MESSAGE/ PROBLEM	REASON		SOLUTION	
NIBP: Retry Pump Higher	1	A measurement has been attempted but no reading was possible. This results from inadequate cuff inflation pressure.	1 2 3	Retry will be attempted. Check that appropriate patient size is set. Pre-set initial inflation pressure.
NIBP: Retry	1 2 3 4 5	Cuff is loosely wrapped. The cuff may be too loosely wrapped or not attached at all. Weak signal. The pulse of the patient may be too weak or the cuff is loosely wrapped. Excessive motion. In measurement, signals contain motion artifact or too much interference. Time-out. Measurement takes more than 120 seconds in ADU/PED mode and 90 seconds in NEO mode. Retry Overpressure or bad measurement.	1	Retry will be attempted. Check for leaks and quality of peripheral pulses. Decrease patient movement. Switch cuff to another limb.
NIBP: Initialization Error	1	During the IBP module power-on, as the IBP module communication stops, system fails to communicate with module.	1	Contact Technical Support.
NIBP: Communication Stop	1	As the Resp module communication stops, the data packets sent by the module can not be received.	1	Contact Technical Support.

3.16.3 SpO_2 Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
SpO_2: No Sensor	1	Sensor is not plugged in to the monitor.	1	Plug the sensor into the monitor.
SpO_2: Sensor Off	1	Sensor may not be connected to the patient.	1	Check patient connection.
SpO_2: Interference (Masimo/Nellcor Only)	1	Noise detected on the pulse signal prevents pulse discrimination.	1	Decrease patient motion, check sensor.
SpO_2: Pulse Search	1	Hardware settings are being adjusted in order to discriminate a pulse waveform.	1 2	Change to site where pulse is stronger if patient is vasoconstricted. Change or readjust sensor if loose.
SpO_2: No Pulse (DPM/Nellcor Only)	1	No detectable pulse is measured.	1	Check to patient connection and patient status.

MESSAGE/ PROBLEM	REASON		SOLUTION	
SpO_2: Failure	1	The system has detected an unrecoverable failure of the SpO_2 system.	1	Power cycle unit. If message reappears, contact Technical Support.
SpO_2: Low Perfusion (Masimo/DPM only)	1	Patient perfusion is low.	1	Check to patient connection and patient status.
SpO_2: Too Much Light (Masimo/DPM only)	1	There is too much ambient room light for the sensor to function properly.	1	Minimize the room light around the patient. Check sensor.
SpO_2: Unrecognized Sensor (Masimo SET Only)	1	The monitor does not recognize the sensor.	1	Replace the sensor with a recommended sensor.
SpO_2: Communication Error	1	The monitor and the SpO_2 modules are not communicating properly.	1	Power cycle unit. If problem persists, contact Technical Support.
SpO_2: Board Fault (Masimo Only)	1	Masimo SET board failed to operate properly.	1	See Proper Service Menu: Suggestion.
SpO_2: Sensor Fault	1	Defective Sensor.	1	Replace Sensor.
SpO_2: Motion (Nellcor Only)	1	Motion is detected.	1	Decrease patient motion, check sensor.
SpO_2: Weak Pulse (Nellcor Only)	1	Low pulse amplitude.	1	Contact Technical Support.
SpO_2: Low Signal (Nellcor Only)	1	The SpO_2 signal is too low or too weak.	1 2	Check sensor placement, move as necessary. Switch limb / Notify physician.
SpO_2: Check Sensor (Nellcor Only)	1	The SpO_2 module has sensed a poor connection or a bad sensor.	1	Reconnect the same sensor. If problem persists, replace sensor.
SpO_2: Weak Signal (Nellcor Only)	1	The SpO_2 signal is too low or too weak.	1 2 3	Check patient. Reposition sensor. Change sensor.
Unable to obtain SpO_2 reading	1 2 3	Patient has poor perfusion. Sensor not on Patient. Cables loose / not connected. Ambient light.	1 2 3 4	Switch limbs / Notify physician. Reapply sensor. Check connections, switch cable. Switch limbs and cover sensor with opaque material.
No SpO_2 waveform	1 2	Waveform not selected to Display. Cable or sensor not plugged in.	1 2	Go to the Display Setup Menu, choose to display Pleth in the waveform area. Check cable and sensor.
SpO_2: Initialization Error	1	No response after send order during initialization.	1	Contact Technical Support.

MESSAGE/ PROBLEM	REASON		SOLUTION	
SpO_2: Communication Error	1	The monitor and the SpO_2 modules are not communicating properly.	1	Contact Technical Support.
SpO_2: Communication Stop	1	As the SpO_2 module communication stops, the data packets sent by the SpO_2 module can not be received.	1	Contact Technical Support.

3.16.4 Temperature Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
Temperature Probes not Working	1	Poor contact from probes to body.	1 2	Check the body surface contact at the probe tip. Reposition or apply thermoconductive gel.
Temperature not displayed	1 2	Improper display setup. Cable not plugged in.	1 2	Check display setup in Monitor Setup Menu and change as desired. Check the cable.
Temp: Communication Stop	1	As the Temp module communication stops, the data packets sent by the Temp module can not be received.	1	Contact Technical Support.
Temp: Communication Error	1	Temp module communication error. The command can not be send correctly.	1	Contact Technical Support.
Temp: SelfTest Error	1	Module sends out error during selftest because of some unspecified reasons.	1	Contact Technical Support.
Temp: Calibration Error	1	A calibration failed.	1 2	Restart the monitor. Contact Technical Support.
Temp: Initialization Error	1	During the Temperature module power-on, as the Temperature module communication stops, system fails to communicate with module.	1	Contact Technical Support.

3.16.5 Resp Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
Resp. Waveform Too Large	1	Scales set inappropriately.	1 2	Change lead selection. Change Respiration scale.
Resp. Waveform Too Small	1	Patient breathing is shallow or patient is turned on side.Scale set inappropriately.	1 2	Change lead selection. Change respiration scale.
False Apnea Alarm	1 2 3	Apnea delay may be improperly set. Patient may be having frequent episodes of CVA. Scale size may be too low.	1 2 3	Choose another apnea delay. Reposition electrodes to better detect respirations. Change Respiration scale.
No Resp. Waveform or Rate Displayed	1 2 3	Respiration turned Off. Patient connected using ESIS choke cable. Cable not connected.	1 2 3	Turn respiration On (Off will be displayed in Resp. window). Check that proper patient cable is used. Use non ESIS patient cable. Check cable.
"CHK Lead" Message	1 2 3 4 5 6	Increased impedance caused by one of the following: Chest hair under electrodes. Dried electrode gel. Electrode off. Lead off. Cracked lead wires. Poor skin prep.	1 2 3 4 5 6	Prep chest. Change electrodes. Replace electrode. Replace lead. Replace lead wires. Clean and abrade skin before applying electrodes.
Resp high impedance	1 2 3	Connections not tight and/or properly secured. Electrodes dry or loose. Cable or lead wires damaged.	1 2 3	Ensure proper connection. (Electrode to lead, lead to cable, cable to monitor). Re-prep skin and apply fresh, moist electrodes. Check with continuity tester.
"CVA" Message	1 2	Can be caused by shallow breathing or an apnea event. Patient HR and respiratory rate identical.	1 2	Check the patient. Adjust scales or leads if necessary. Check the patient.
Resp: Initialization Error	1	During the Resp module power-on, as the Resp module communication stops, system fails to communicate with module.	1	Contact Technical Support.

MESSAGE/ PROBLEM	REASON		SOLUTION	
Resp: Communication Error	1	System cannot communicate correctly with Resp module, and receive the error data packets.	1	Restart the monitor. If the error still appears, please contact Technical Support.
Resp: Communication Stop	1	As the Resp module communication stops, the data packets sent by the module can not be received.	1	Contact Technical Support.

3.16.6 IBP Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
Damped Invasive Waveform	1 2 3 4 5	Air bubbles in tubing. Kinked catheter. Catheter against wall of blood vessel. Blood in tubing Catheter partially occluded with clot.	1 2 3 4 5	Eliminate air from tubing. Change position of catheter, check patient. Check for leaks at connector, flush catheter. Pump pressure bag up to 300 mmHg. Consult physician.
IBP not Displayed / No IBP Waveform	1 2 3 4 5	Improper Setup. Cable not plugged in Transducer not connected. Stopcock turned improperly. Transducer not zeroed.	1 2 3 4 5	Check display setup in monitor setup. Check cable. Check transducer connection. Check transducer. Check and zero the transducer.
Abnormally High or Low readings	1	Transducer too HIGH or too LOW.	1	Check patient adjust transducer, re-zero.
Sensor Off	1	The IBP sensor disconnected from the patient or the monitor.	1	Reconnect sensor, re-zero IBP channel.
Sensor Off. Cannot Zero!	1	Sensor Off. And can not zero IBP channel.	1	Reconnect sensor, re-zero IBP channel.
Pulsatile Pressure. Cannot Zero!	1	Input the pulsatile pressure, can not zero IBP channel.	1	Input the static pressure, re-zero IBP channel.
Pressure Overrange. Cannot Zero!	1	The pressure is overrange, can not zero IBP channel.	1	Check the static pressure value, re-zero IBP channel.
Initialization Error	1	During the IBP module power-on, as the IBP module communication stops, system fails to communicate with module.	1	Contact Technical Support.

MESSAGE/ PROBLEM	REASON		SOLUTION	
Communication Error	1	IBP communication error. The command can not be send correctly.	1	Power cycle unit. If message reappears, contact Technical Support.
Communication Stop	1	As the IBP module communication stops, the data packets sent by the IBP module can not be received.	1	Power cycle unit. If message reappears, contact Technical Support.

3.16.7 CO_2 Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
CO_2: Check Flow Rate (Microstream only)	1	The system has detected a high or low flow rate.	1	Check Filterline and replace if necessary.
CO_2: Filtering Disconnected (Microstream only)	1	Filtering disconnected.	1	Connect Filterline to monitor.
CO_2: Purge (Microstream only)	1	Sample line is blocked or kinked.	1	Check sample line. Clear blockage or kink or replace with a new sample line.
CO_2: Occlusion (Microstream only)	1	Sample line is blocked or kinked.	1	Check sample line. Clear blockage or kink or replace with a new sample line.
CO_2: Sensor High Temperature (DPM only)	1	Temperature over ranges high limit checked by module.	1	Check, stop using or replace the sensor.
CO_2: Sensor Low Temperature (DPM only)	1	Temperature over ranges low limit checked by module.	1	Check, stop using or replace the sensor.
CO_2: High Airway Press. (DPM only)	1	Measurement of Flux Sensor in module is higher than 790 mmHg.	1 2	Check airway's output and connection. If problems remain, return it to factory for maintaining.
CO_2: Low Airway Press. (DPM only)	1	Measurement of Flux Sensor in module is less than 400 mmHg.	1 2	Check airway's output and connection. If problems remain exist, return it to factory for maintaining.
CO_2: High Barometric (DPM only)	1	Atmospheric pressure is too high (higher than 790mmHg).	1 2	Check the CO_2 connections, make sure that the monitor application site meets the requirements, and check for special sources that affect the ambient pressure. Restart the monitor.

MESSAGE/ PROBLEM	REASON		SOLUTION	
CO_2: Low Barometric (DPM only)	1	Atmospheric pressure is too low (lower than 428mmHg).	1 2	Check the CO_2 connections, make sure that the monitor application site meets the requirements, and check for special sources that affect the ambient pressure. Restart the monitor.
CO_2: FilterLine Error (DPM only)	1	Filterline is leaked or blocked.	1	Check if there is a leak in the CO_2 sample line or the CO_2 sample line has been occluded.
CO_2: Initialization Error (DPM/Microstream only)	1	No response after send order during initialization.	1	Contact Technical Support.
CO_2: SelfTest Error (DPM/Microstream only)	1	Module can not work because of software fault, circuit error, etc.	1	Contact Technical Support.
CO_2: Communication Error (DPM/Microstream only)	1	The monitor receives wrong response from CO_2 module.	1	Contact Technical Support.
CO_2: Communication Stop (DPM/Microstream only)	1	Sending out order is failed during work.	1	Contact Technical Support.
CO_2: Check Airway (Microstream only)	1	Airway Error	1	Check airway connection.
CO_2: Main Board Error (Microstream only)	1	Module has problems.	1 2	Reset the module. Contact Technical Support.
CO_2: Replace Scrubber & Pump (Microstream only)	1	Module has problems.	1 2	Restart the monitor. Contact Technical Support.
CO_2: 15V Overrange (Microstream only)	1	Power supply to module is out of range.	1 2 3	Check power supply. Restart the monitor. Contact Technical Support.
CO_2: Hardware Error (DPM only)	1	Module has problems.	1 2	Restart the monitor. Contact Technical Support.
CO_2: No Watertrap (DPM only)	1	No watertrap on CO_2 module	1	Make sure to plug-in water trap, and make sure it is firmly connected and fastened.
CO_2: Temperature Overrange (Microstream only)	1	Temperature sensor installed in the gas cell has read temperature value below 5 or above 70.	1	Make sure the device is not working in extreme hot or cold condition. Apply cooling or heating if possible.
CO_2: Check Sensor (Microstream only)	1	Possible Faulty sensor.	1 2	Replace the module. Contact Technical Support.

MESSAGE/ PROBLEM	REASON		SOLUTION	
CO_2: Warming up (DPM/Microstream only)	1	The CO_2 sensor has not reached its operating temperature.	1 2	It takes typically 30 seconds for the sensor to warm up. Wait for the message to go away.
CO_2: Startup (DPM only)	1	The CO_2 is starting up.	1	Wait for the message to go away.
Calibration Completed Successfully (DPM/Microstream only)	1	Calibration finished and successful.	/	
Not Ready For Calibration (DPM/Microstream only)	1	Module in unable to initialize calibration.	1	Repeat calibration procedure. If problem persists, contact Technical Support.
CO_2: Zeroing... (DPM/Microstream only)	1	The device is adjusting the sensor signal to predefined range for better measurement.	1	This is normal operation. Wait for message to clear.
CO_2: Zero Failed (DPM/Microstream only)	1	Signal cannot be adjusted to predefined range within zeroing duration.	1	Check the CO_2 connections. After the sensor's temperature becomes stabilized, perform a zero calibration again. If problem persists, contact Technical Support.
Calibration Error (DPM/Microstream only)	1	The actual concentration of calibration gas applied is in wide discrepancy with the concentration value entered by the user in the Calibration dialog.	1 2	Make sure the concentration value entered is the same as the calibration gas applied. Repeat calibration procedure. If problem persists, contact Technical Support.
Caused by no gas or wrong gas concentration (Microstream only)	1	No gas or wrong gas concentration.	1	Check the gas connections or gas concentration. Repeat calibration procedure. If problem persists, contact Technical Support.
Caused by Measurement Error (Microstream only)	1	Measurement Error	1	Repeat calibration procedure. If problem persists, contact Technical Support.
Caused by no stable gas flow (Microstream only)	1	No stable gas flow	1	Check the gas connections or gas concentration. Repeat calibration procedure. If problem persists, contact Technical Support.

3.16.8 Gas Module Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
GM: Agents Uncalibrated	1	Appears after an unsuccessful calibration attempt of the agent sensor. The numeric data for all agents will appear as XXX, and the agent waveform will be a flatline.	1	Ensure proper gas mixture is attached tightly and regulator is on. Repeat calibration procedure. If problem persists, contact Technical Support.
GM: CO_2 Uncalibrated	1	Appears after an unsuccessful calibration attempt of the CO_2 sensor. The numeric data for CO_2 will appear as XXX, and the CO_2 waveform will be a flatline.	1	Ensure proper gas mixture is attached tightly and regulator is on. Repeat calibration procedure. If problem persists, contact Technical Support.
GM: N_2O Uncalibrated	1	Appears after an unsuccessful calibration attempt of the N_2O sensor. The numeric data for N_2O will appear as XXX, and the N_2O waveform will be a flatline.	1	Ensure proper gas mixture is attached tightly and regulator is on. Repeat calibration procedure. If problem persists, contact Technical Support.
GM: O_2 Uncalibrated	1	Appears after an unsuccessful calibration attempt of the O_2 sensor. The numeric data for O_2 will appear as XXX, and the O_2 waveform will be a flatline.	1	Ensure proper gas mixture is attached tightly and regulator is on. Repeat calibration procedure. If problem persists, contact Technical Support.
GM: Agent Zero Error	1	Appears when the system has been unable to successfully zero the anesthetic agent sensor.	1	Manually start zeroing the system again. If problem persists, contact Technical Support.
GM: CO_2 Zero Error	1	Appears when the system has been unable to successfully zero the CO_2 sensor.	1	Manually start zeroing the system again. If problem persists, contact Technical Support.
GM: N_2O Zero Error	1	Appears when the system has been unable to successfully zero the N_2O sensor.	1	Manually start zeroing the system again. If problem persists, contact Technical Support.
GM: O_2 Zero Error	1	Appears when the system has been unable to successfully zero the O_2 sensor.	1	Manually start zeroing the system again. If problem persists, contact Technical Support.

MESSAGE/ PROBLEM	REASON		SOLUTION	
GM: Cannot Zero...Retrying	1	Appears when **Passport V** requests Zeroing (either on the automatic cycle or by a user request) and the Gas Module is unable to initialize the cycle.	1	Allow system to retry without intervention. If problem persist, contact Technical Support.
GM: Warming Up	1	Appears when the system has been turned on, and the sensors have not reached their stable operating temperature.	1	Wait for the message to go away. It takes up to five minutes for the device to warm up.
GM: Air Leak	1	Appears when the system detects a pneumatic leak.	1	Turn Gas Module and **Passport V** Off.
	2	Also may appear when the Gas Module has been turned on without a sample line attached.	2	Install/check sample lines, filters, water trap and electrical connections.
	3	Gas Module has been on for a long period of time without **Passport V** Monitor being on.	3	Turn off Gas Module. Turn on Gas Module and **Passport V** Monitor
GM: Replace Trap	1	Indicates residue build-up on the water trap membrane that is decreasing airflow.	1	Replace water trap reservoir.
GM: Exhaust Blocked	1	Appears when the system detects a blockage at the exhaust gas outlet, as indicated by an increase in internal pressure.	1	Remove waste gas scavenging assembly, check if message disappears.Check exhaust line for blockage and clear if possible. If message persists contact Technical Support.
GM: Failed	1	Appears when the Gas Module detects an unrecoverable error in its own operation.	1	Contact Technical Support.
GM: Occlusion	1	Appears when the system detects an obstruction in the sampling line or the water trap bottle is full.	1	Empty and rinse water trap. Change water trap, if necessary,
			2	Check sampling line and filter for blockage, clear sampling line if possible. Replace sampling line and/or filter if necessary.
			3	Check exhaust line for blockage and clear if possible. If problem persists, contact Technical Support.
GM: Pump Off	1	Appears when the system has turned off the pump due to a pneumatic error.	1	Restart the pump from the Gas Menu. If problem persists, contact Technical Support.

MESSAGE/ PROBLEM	REASON		SOLUTION	
GM: Unknown Agent	1	Appears when the system detects a gas that does not match the spectroscopic signatures of the five known anesthetic agents.	1	Use recognized agent.
Sampling Error	1	Appears when a sampling error occurs on one or more Gas Module channels during calibration.	1	Repeat calibration procedure. If problem persists, contact Technical Support.
Not Ready For Calibration	1	Appears when the Gas Module is unable to initialize calibration.	1	Repeat calibration procedure. If problem persists, contact Technical Support.
Zeroing Error	1	Appears when the Gas Module cannot perform a Zeroing during calibration.	1	Repeat calibration procedure. If problem persists, contact Technical Support.
GM: Communication Error	1	System cannot communicate correctly with Resp module, and receive the error data packets.	1	Restart the monitor. If the error still appears, please contact Technical Support.
GM: Disconnected	1	Appears when the **Passport V** cannot detect signals being sent by the Gas Module.	1	Ensure Gas Module is turned on and interface cable is properly connected. If problem persists, contact Technical Support.

3.16.9 Trends Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
No Trends displayed	1	Trend page is scrolled.	1	Use scroll button in Trend Menu to scroll to top of Trend Menu.
Patient data is missing when power cycling unit	1	Data storage card abnormal.	1	Contact Technical Support.

3.16.10 Printer/Recorder Troubleshooting

MESSAGE/ PROBLEM	REASON		SOLUTION	
Recorder Report Appears Totally Blank	1	Thermal paper may be installed incorrectly (up-side down).	1	Remove paper and re-install with paper feeding off of the spool from the bottom.
Local Printer Door Open	1	The printer door is not closed.	1	Close the printer door.
Local Printer Out Of Paper	1	Printer out of paper.	1	Replace with a new roll of paper.

MESSAGE/ PROBLEM	REASON		SOLUTION	
Local Printer Busy	1	Printer received multiple print requests at one time.	1	Wait until the printer is not busy.
Local Printer Unable To Print	1	The system has detected an unrecoverable printer failure.	1	Power cycle unit. If message reappears, contact Technical Support.
Check Laser Printer	1	Laser printer is busy, disconnected, out of paper or has a fault condition.	1	Check laser printer.
No print on Alarm	1	Alarm printing not active.	1	Go to Alarm Setting Menu and set Print on Alarm to Active, then set Recorder to On.
Trends not printing	1 2 3	**Print Trend** not pressed. No Trends displayed. No paper.	1 2	Press **Print Trend** when trend window is open. Use scroll feature to scroll to the top of the trend, then press **Print Trend**. Check / Replace paper.
Local Printer Comm Error	1	Thermal paper may be installed incorrectly (up-side down).	1	Remove paper and re-install with paper feeding off of the spool from the bottom.
Local Printer SelfTest Error	1	The printer door is not closed.	1	Close the printer door.
Thermal Printhead Overheated	1	Printer out of paper.	1	Replace with a new roll of paper.
Printer Buffer Full	1	The printer buffer is full.	/	
No printer selected or available	1	No printer selected is available from the network.	1	Check the selected printer from the network and make sure the printer model is supported by **Passport V** monitor.
Remote Printer Not Available	1	This message is displayed in the case of a printer error.	1	Fix the printer.

3.16.11 Monitor/Display Troubleshooting

MESSAGE/ PROBLEM	REASON	SOLUTION
No trace for a desired parameter	1 Improper attachment of transducer or cable to monitor. 2 Faulty transducer or cable.	1 Check transducer / cable connection. 2 Replace transducer or cable.
Display Appears to be Off	1 Mains power switch may not be on. 2 Unit may not be plugged into an AC outlet. 3 If used as a portable, battery pack may be drained.	1 Check mains power switch on side panel. 2 Check if power cord is plugged into an AC outlet. 3 If battery pack is drained, plug into an AC outlet to recharge the battery. Power unit back on. Contact Technical Support.
Disabled Alarm Tone	1 **Silence** key pressed. 2 Beep volume low.	1 Check for alarm silence symbol and message. 2 Increase beep volume.
Cooling Fan Failure	1 The unit running on AC power and the cooling fan is not operational.	1 Contact Technical Support.
Patient Information did not appear on display	1 No data entered. 2 Done was not selected from keypad after entering data.	1 Enter proper patient data. 2 Go to the proper keypad, enter data, and select Done when finished.
Incorrect Date or Time	1 Data not entered or entered incorrectly.	1 Follow instructions from "How to Set the Clock / Date and Time".

3.16.12 Remote View Troubleshooting

MESSAGE/ PROBLEM	REASON	SOLUTION
The patient monitor is connected to a LAN but cannot view other patients in the Remote View window.	1 Incorrect LAN cable connection. 2 Excessive requests for viewing the patient monitor at the same time. 3 Incorrect IP configuration.	1 Check LAN cable connection. LAN cable shall not be longer than 50m. 2 A patient monitor can only be viewed by 4 other patient monitors at the same time. The excessive view requests system will be ignored. 3 Check for IP address conflict. Reconfigure IP address.

3.17 Installation Menu

3.17.1 Installation Mode

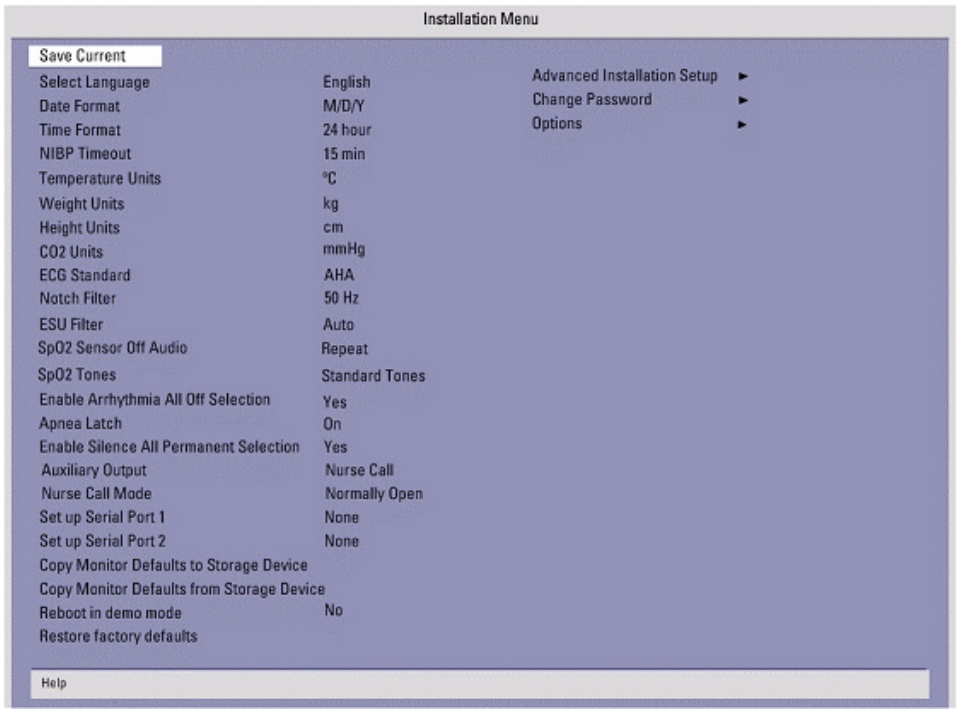


FIGURE 3-69 Installation Menu

The following items are set through the Installation Mode menu: Language, Date Format, Time Format, NIBP Timeout, Temperature Units, Weight Units, Height Units, CO_2 Units, ECG Standard, Notch Filter, ESU Filter, SpO_2 Sensor Off Audio, SpO_2 Tones, Enable Arrhythmia All Off Selection, Apnea Latch, Enable Silence All Permanent Selection, Auxiliary Output, Nurse Call Mode, Set up Serial Port 1, Set up Serial Port 2, Copy Monitor Defaults to Storage Device, Copy Monitor defaults from Storage Device, Reboot in demo mode, Restore factory defaults, Advanced Installation Setup, Change Password, and Options.

1. Enter Installation Mode by pressing and holding the **Discharge** key while powering on the monitor.
2. Set each item as necessary. The operation of the menu is the same as that of the normal operating mode. To save all of the selected settings, choose Save Current before exiting this menu. To access the normal operation screen, power the unit OFF and ON again.

The following table describes the Installation Menu structure:

MENU TITLE ON SCREEN	**MENU CHOICES**	**DEFAULT**	**ACTIONS/ COMMENTS**
Save Current			Select to save current settings as defaults.
Select Language	English, German, French, Italian, Spanish, Portuguese, Dutch	English	Select to change language.
Date Format	M/D/Y, D/M/Y, Y/M/D	M/D/Y	Select to change date format.
Time Format	12 hour, 24 hour	12 hour	Select to change time format.
NIBP Timeout	15min, 30min, 45min, 60min	15min	Selects time old and data is removed from screen.
Temperature Units	°C, °F	°F	Select to change temperature units.
Weight Units	kg, lbs	lbs	Select to change weight units.
Height Units	cm, Ft/inches	inches	Select to change height units.
CO_2 Units	mmHg, %, kPa	mmHg	Select to change CO_2 units.
ECG Standard	AHA, IEC	AHA	Select to change ECG lead standard.
Notch Filter	50Hz, 60Hz	60Hz	Select to change notch filter frequency.
ESU Filter	Auto, Disable	Auto	Select to change ESU Filter setting.
SpO_2 Sensor Off Audio	Off, Once, Repeat	Off	Select to change SpO_2 Sensor Off Audio.
SpO_2 Tones	Standard Tones, Alternative Tones	Standard Tones	Select to change the SpO_2 tones.
Enable Arrhythmia All Off Selection	Yes, No	No	Select to enable or disable the Arrhythmia All Off menu selection.
Apnea Latch	On, Off	On	Select to turn apnea alarm latching on or off.
Enable Silence All Permanent Selection	Yes, No	No	Select to enable or disable the Permanent Audio Off menu selection.
Auxiliary Output	Nurse Call, Analog Output, Defib Sync	Nurse Call	Select to change the Auxiliary Output.
Nurse Call Mode	Normally Open, Normally Close	Normally Open	Select to change Nurse Call Mode.
Set up Serial Port 1	None, DIAP, Gas Module	None	Select to set up a serial output protocol port.

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	ACTIONS/ COMMENTS
Set up Serial Port 2	None, DIAP, Gas Module	None	Select to set up a serial output protocol port.
Copy Monitor Defaults to Storage Device			Select to copy the monitor defaults and settings to the DPM SB storage device.
Copy Monitor Defaults from Storage Device			Select to copy the monitor defaults and settings from the DPM SB storage device.
Re-boot in demo mode	Yes, No	No	Set to YES to start the monitor in demo mode on next power-up. Normal monitoring will resume after cycling power in demo mode.
Restore factory defaults			Select to restore factory defaults.
Advanced Setup			Select to view/edit Advanced Setup.
Change Password			Select to change password.
Options			Select to view/edit options.

Transferring Monitor Default Settings

When installing several monitors with identical display and alarm settings, a DPM SB storage device can be used to copy the settings from monitor to monitor.

1. Insert the DPM SB storage device into the SB slot of the source monitor.
2. Access the Installation menu by pressing and holding the **Discharge** key while powering on the monitor.
3. Select Copy Monitor Defaults to Storage Device. A status message will report completion of the transfer.
4. Remove the DPM SB storage device and insert it into the SB slot of the receiving monitor.
5. Enter Installation Mode on the receiving monitor by pressing and holding the **Discharge** key while powering on the monitor.
6. Select Copy Monitor Defaults from Storage Device. A status message will report completion of the transfer.
7. Select Save Current and power-cycle the receiving monitor to enter normal monitoring mode.

3.17.2 Advanced Installation Setup Menu

FIGURE 3-70 Advanced Setup Menu

This menu is accessed by selecting Advanced Installation Setup from the Installation Menu. Select each letter using the Navigator Knob. When finished, rotate to Previous Menu and select using the Navigator Knob.

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	TEXT STRINGS
DIAP Baud Rate	9600, 19200	9600	Select to change the DIAP baud rate.
Enable Network	Wired, Wireless	Wired	Select to change network.
IP Address	[0,255]	192.168.0.100	Select to set up IP Address.
Subnet Mask ID	[0,255]	255.255.255.0	Select to set up Subnet Mask ID.
Configure Wireless AP			Select to configure wireless AP.
Search Printer			Select to search printer.
Paper Size	A4, Letter	A4	Select to change paper size.
Device ID			

3.17.3 Options Menu

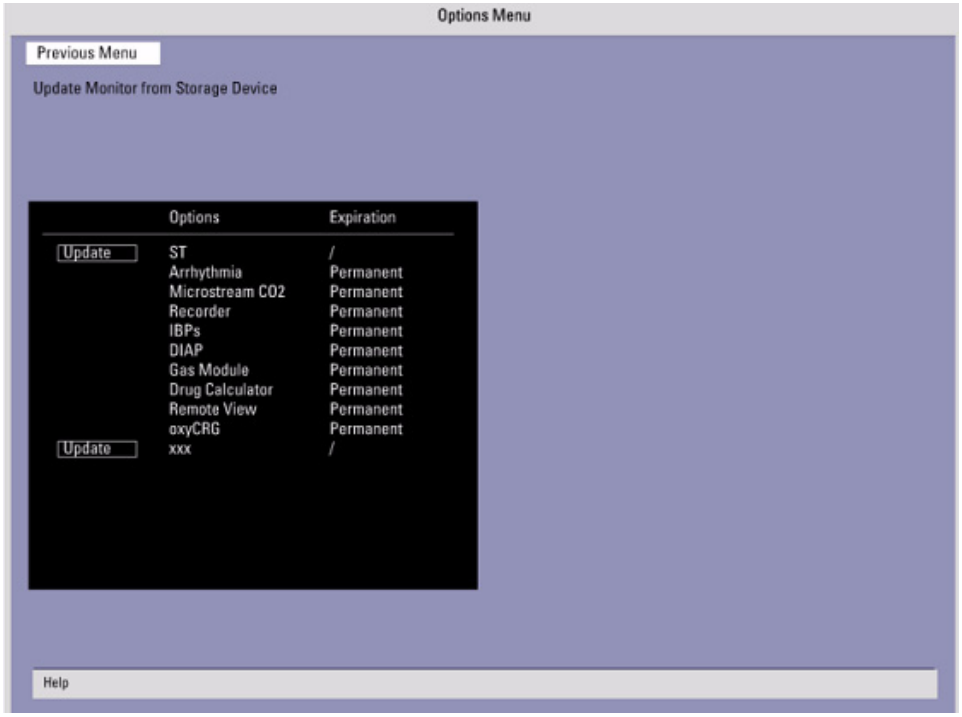


FIGURE 3-71 Options Menu

Select Update Monitor From Storage Device from Options Menu to update the monitor via DPM SB storage device. Updating via DPM SB storage device can only be used to enable certain system functions.

The Update button only appears on the left of an item not yet updated (with "/" on the right) after Update Monitor From Storage Device is selected and license file verification is passed. When Update is selected, updating will begin. When update is complete, Permanent will be displayed in Expiration column. If Update is selected again before the update is completed, updating will be cancelled and "/" will be displayed.

3.18 Trend Storage

The **Passport V** monitor is capable of storing, in non-volatile memory, up to 6000 trend data entries. When the maximum number of entries has been reached, the oldest entry will be deleted to allow storage of new data.

Patient information and trend data stored in the CF card will be available if the monitor restarts within one hour after being powered off. Otherwise, the data will be deleted.

The CF card is a standard configuration.

3.19 Software Download

There are two ways to perform a software download: using PC Software Upgrade Tool to update the monitor via the network, or reading the license in the DPM SB storage device to update the monitor.

The PC Software Upgrade Tool can create a network update package and license only when the software is installed through the administrator's serial number. The user can use the upgrade package to upgrade the patient monitor.

To access the update mode, press the panel key **Trends** while powering up the monitor. If an update signal from the same network is detected, the monitor starts to update software.

The monitor screen will indicate the BIOS version, Host software version, module version, and corresponding status message. The status message "Upgrade is successful! Disconnect the network cable, and reboot the monitor." will display after download is complete.

To update by DPM SB storage device, select Options in installation mode. The update button only appears after Update Monitor From Storage Device is selected and license file verification is passed.

When Update is selected, updating will begin. When update is complete, Permanent will be displayed in the Expiration column. If Update is selected again before update is complete, updating will be cancelled and "/" will be displayed.

Updating by DPM SB storage device can only be used to enable certain system functions.

4.0 *Isometric Drawings and Parts List*

4.1 Introduction

This chapter provides information necessary to identify the replacement parts and assemblies of instruments.

4.2 Top Level Assembly

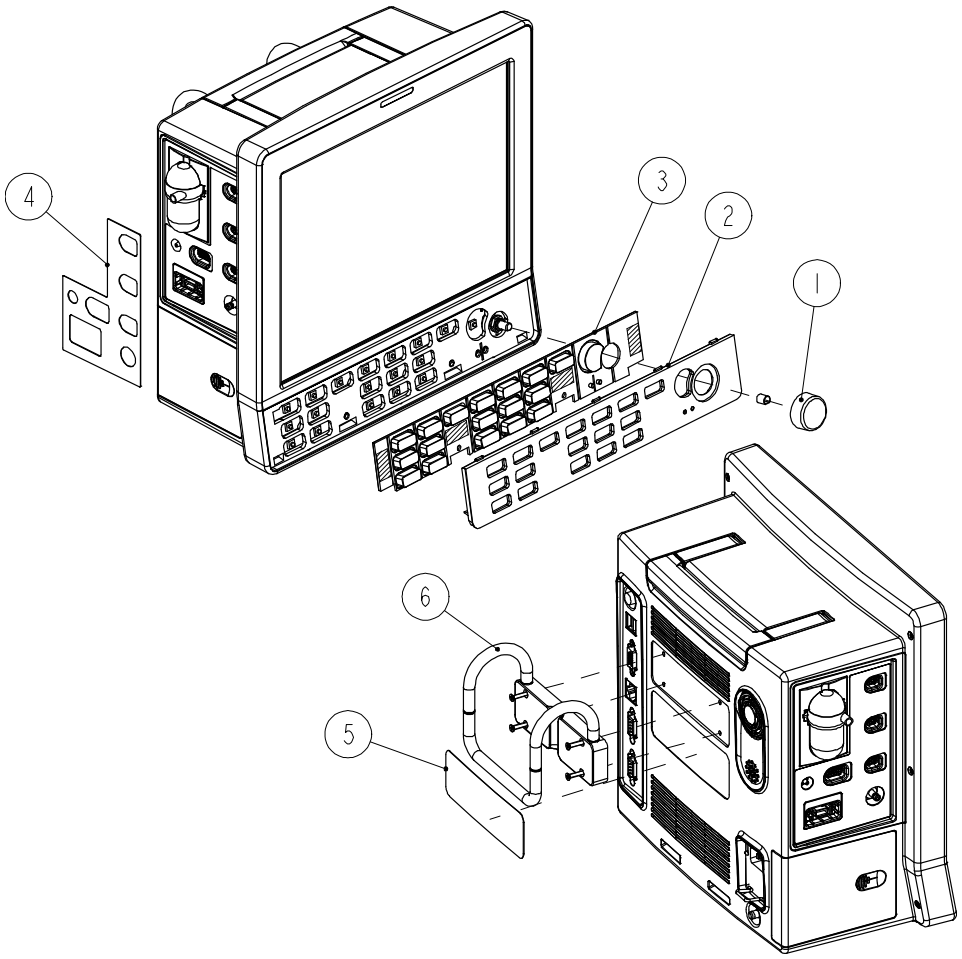


FIGURE 4-1 Top Level Assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Knob service kit	801-6100-00007-00
2	Overlay, Keypad, English	6100-20-86264-51
2	Overlay, Keypad, German	6100-20-86264-52
2	Overlay, Keypad, French	6100-20-86264-53
2	Overlay, Keypad, Spanish	6100-20-86264-54
2	Overlay, Keypad, Italian	6100-20-86264-55
2	Overlay, Keypad, Dutch	6100-20-86264-56
2	Overlay, Keypad, Brazilian Portuguese	6100-20-86264-57
2	Overlay, Keypad Without IBP, English	6100-20-86341-51
2	Overlay, Keypad Without IBP, German	6100-20-86341-52
2	Overlay, Keypad Without IBP, French	6100-20-86341-53
2	Overlay, Keypad Without IBP, Spanish	6100-20-86341-54
2	Overlay, Keypad Without IBP, Italian	6100-20-86341-55
2	Overlay, Keypad Without IBP, Dutch	6100-20-86341-56
2	Overlay, Keypad Without IBP, Brazilian Portuguese	6100-20-86341-57
3	Keypad, English	6100-20-86265-51
3	Keypad, German	6100-20-86265-52
3	Keypad, French	6100-20-86265-53
3	Keypad, Spanish	6100-20-86265-54
3	Keypad, Italian	6100-20-86265-55
3	Keypad, Dutch	6100-20-86265-56
3	Keypad, Brazilian Portuguese	6100-20-86265-57
4	Label, Patient Connector, All	6100-20-86316-51
4	Label, Patient Connector, Basic	6100-20-86346-51
4	Label, Patient Connector, ECG/NIBP/T1/IBP	6100-20-86347-51
4	Label, Patient Connector, ECG/NIBP/T1/CO_2	6100-20-86348-51
5	Label, Product Information	6100-20-86317
6	Bedrail Hook	801-6100-00001-00

4.3 Main Unit Assembly

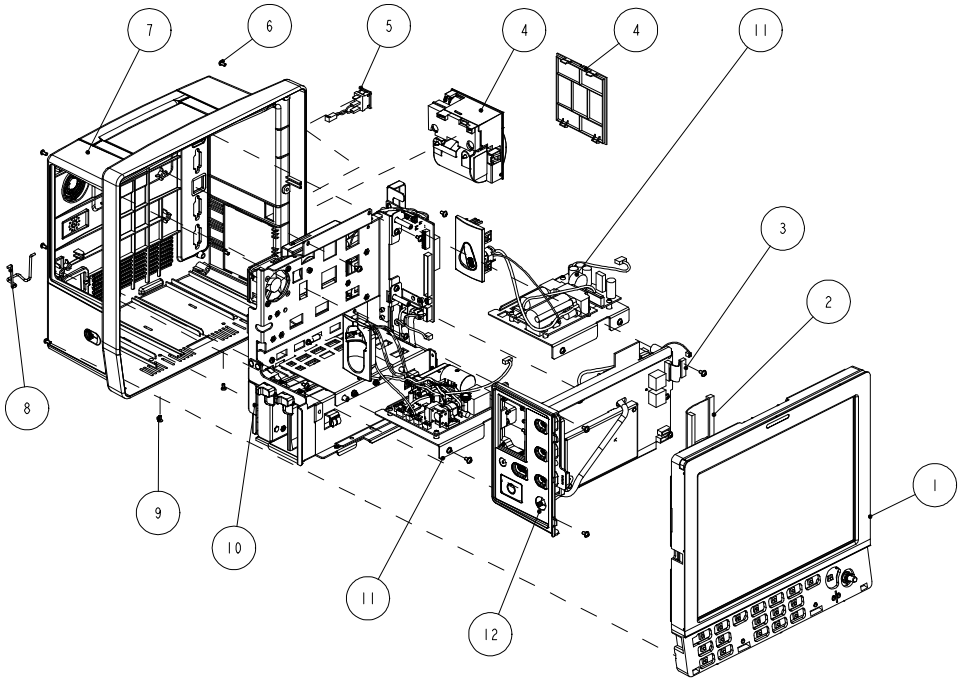


FIGURE 4-2 Main Unit Assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Front Housing Sub-assembly	N/A
2	Cable Assembly, Parameter board to Mainboard	9211-20-87225
3	Cable Assembly, Parameter board to Interface Board	9211-20-87237
4	Recorder door	043-000184-00
4	Recorder	801-6101-00011-00
5	Power Switch with Cable Assembly	6100-21-86306
6	Screw, Pan Head Phillips M3X6	M04-002505––
7	Sub-assembly, Rear Housing	N/A
8	AC Inlet Hook	9211-20-87369
9	Screw, Flat Head Phillips M3X8	M04-000405––
10	Sub-assembly, Main Chassis	N/A
11	Microstream CO_2 Module Assembly	801-6100-00029-00
11	DPM CO_2 Module Assembly	801-6100-00030-00
12	Sub-Assembly, Parameter board subassembly	N/A

4.4 Front Housing Sub-assembly

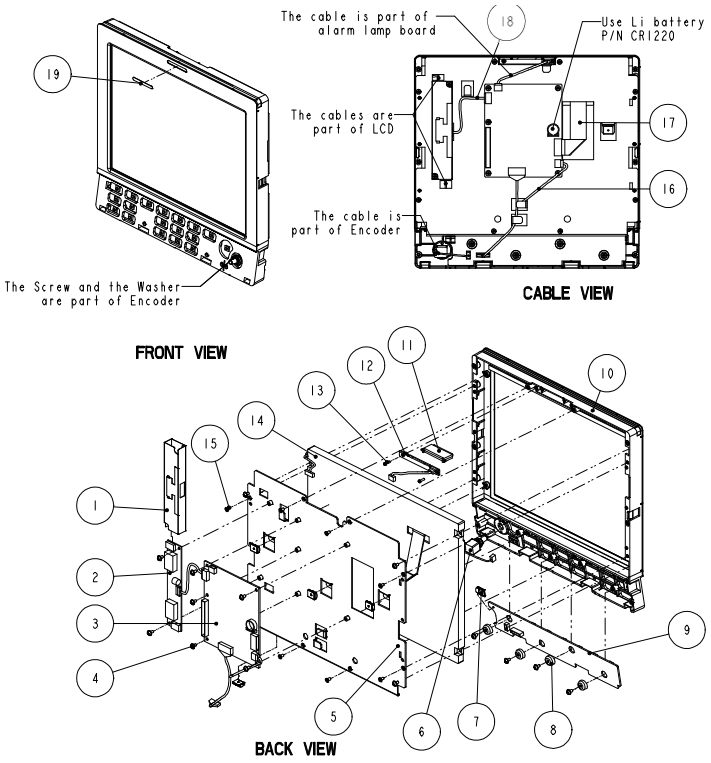


FIGURE 4-3 Front Housing Sub-assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Insulator, Inverter	N/A
2	CCFL Inverter Unit	801-6100-00003-00
3	PCBA, main board service kit	801-6100-00004-00
4	Screw, Pan Head W/Washer Phillips M3X6	M04-004012––
5	Plate, Front Housing	6100-20-86263
6	Encoder, Optical,16 pos. 5VDC Dip6	0000-10-10789
7	Spring, EMI	0000-10-10996
8	Mounting Washer, Keypad PCB	6100-20-86269
9	PCBA, Keypad	801-6100-00006-00
10	Front housing service kit	801-6100-00005-00
11	Lens, Alarm Light	6100-20-86267
12	PCBA, Alarm Light	801-6100-00008-00
13	Screw, Self-Tapping PT2X6	M04-051003––
14	LCD,TFT 12.1" 800x600 3.3V	801-0000-00005-00
15	Screw, Flat Head Phillips M3X6	M04-005005––
16	Cable Assembly, Mainboard to Keypad PCBA	6100-20-86304
17	Cable Assembly, LCD to Mainboard	6100-20-86340
18	Cable Assembly, Inverter to Mainboard	9211-20-87235
19	Overlay, Alarm Light	6100-20-86268

4.5 Rear Housing Sub-assembly

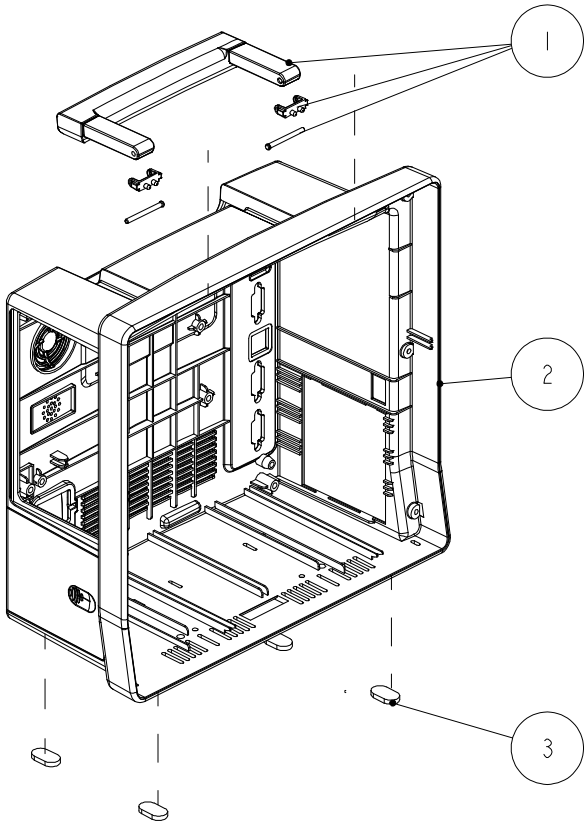


FIGURE 4-4 Rear Housing Sub-assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Handle service kit	801-6100-00009-00
2	Rear Housing service kit	801-6100-00010-00
3	Foot	DA6H-20-22831

4.6 Main Chassis Sub-assembly

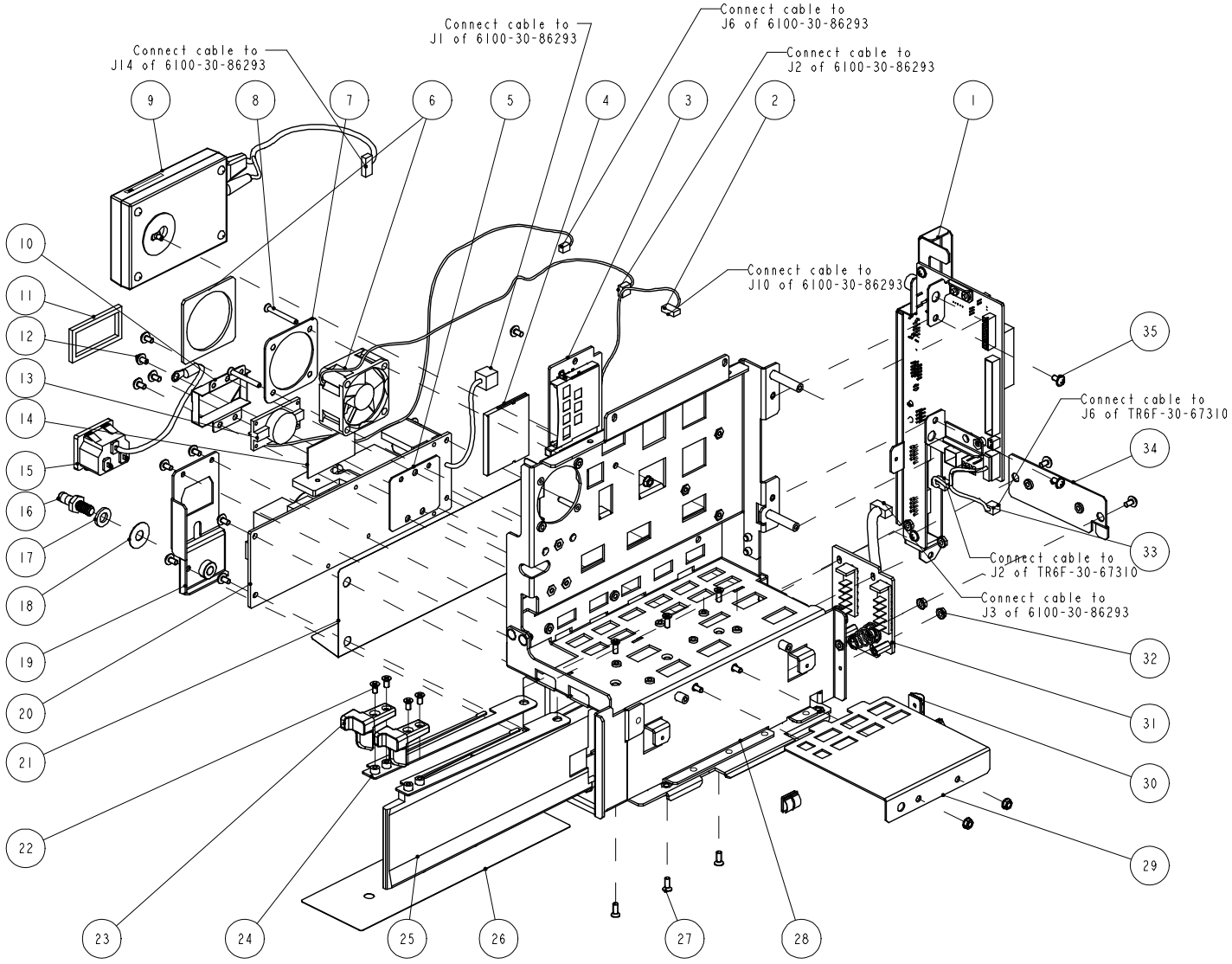


FIGURE 4-5 Main Chassis Sub-assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Interface Connector PCB Assembly	801-6100-00025-00
2	Cable from the interface board to CF card board	6100-20-86302
3	CF card assembly	801-6100-00012-00
4	Storage card CF card 1GB iCF4000	801-0000-00006-00
5	Speaker bolster plate	6100-20-86281
6	Fan service kit	801-6100-00013-00
7	Plate, Fan Retaining	6101-20-46731
8	Screw, Flat Head Phillips M3X25	M04-051172––
9	Module, Wireless AP	801-6100-00014-00
10	Retainer plate, speaker	6100-20-86280
11	Speaker gasket	6006-20-39418
12	Screw, Combined screw M3X8	N/A
13	Speaker cable 4ohm 2W 350mm	020-000001-00
14	Gasket, Speaker pressure plate and spacer	8002-20-36218
15	AC Inlet with Cable Assembly	9211-20-87221
16	Grounding terminal	0509-20-00098
17	Serrated lock washers external teeth GB/T862.2-1987 6 plated with anti-rustiness nickel	M04-021048––
18	Washer, Grounding pillar	6100-20-86393
19	Bracket, AC Inlet	N/A
20	PCBA, Power Supply	801-6100-00015-00
21	Insulator, Power Supply Board	N/A
22	Screw, Flat Head Phillips M3X6	N/A
23	Battery latch	6100-20-86255
24	Battery latch spring	6100-20-86252
25	Battery compartment overlay	6100-20-86406
26	Clapboard, battery (tool HM-070)	9000-20-07329
27	Screw, Flat Head Self-Tapping PT3X8	N/A
28	Bracket, Main	N/A
29	Battery latch retaining plate	N/A
30	Spring, EMI	0000-10-10996
31	PCBA, Li-Battery	801-6100-00016-00
32	Nut, Lock WasherM3	N/A
33	Cable Assembly, Recorder	9211-20-87228
34	Plate, Recorder Mounting	N/A
35	Screw, Pan Head W/Washer Phillips M3X6	M04-004012––

4.7 Interface Connector PCB Assembly

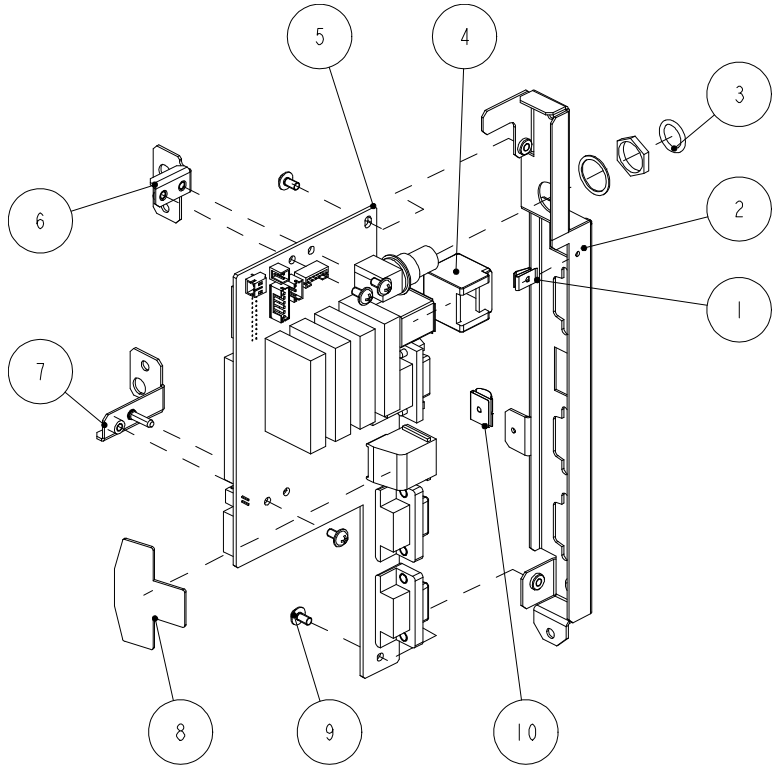


FIGURE 4-6 Interface Connector PCB Assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Spring, EMI	M6T-030006––
2	Bracket, Interface Board Mounting	6100-20-86277
3	Seal (O-ring) 9.5X1.8 silicone A75 (brown)	M6M-010009––
4	Silica gel waterproof wrap, SB	6100-20-86275
5	PCBA, Power Supply Management and Interface	Use assembly P/N 801-6100-00025-00
6	Bracket, Interface Board Top	N/A
7	Bracket, Interface Board Bottom	N/A
8	Gasket, Network Socket	9211-20-87440
9	Screw, Pan Head W/Washer Phillips M3X6	M04-004012––
10	Spring, EMI	0000-10-10996

4.8 Parameter Sub-assembly

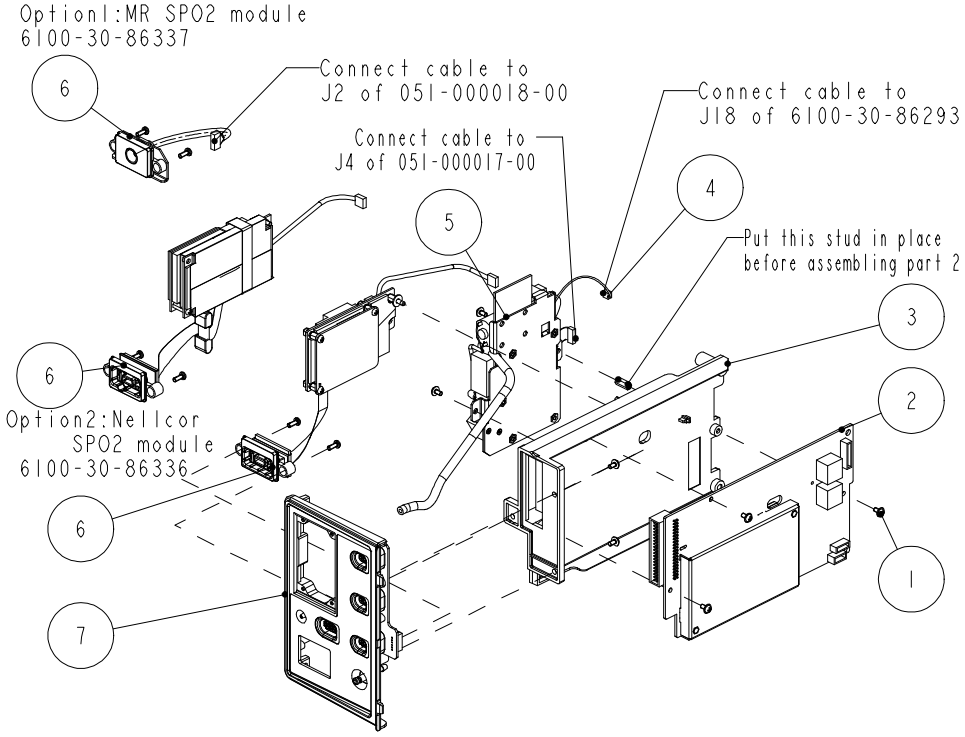


FIGURE 4-7 Parameter Sub-assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Screw, Pan Head W/Washer Phillips M3X6	M04-004012––
2	Module, Integrated Parameter	801-6100-00017-00
3	Frame, Parameter Board Mounting	6100-20-86276
4	Cable Assembly, NIBP	6100-20-86305
5	NIBP Module Assembly	801-6100-00026-00
6	Masimo SpO_2 Module Assembly	801-6100-00028-00
6	Nellcor SpO_2 Module Assembly	801-6100-00027-00
6	DPM SpO_2 Module Assembly	801-6100-00024-00
7	Sub-assembly, Patient Connector	801-6100-00018-00

4.9 Patient Connector Sub-assembly

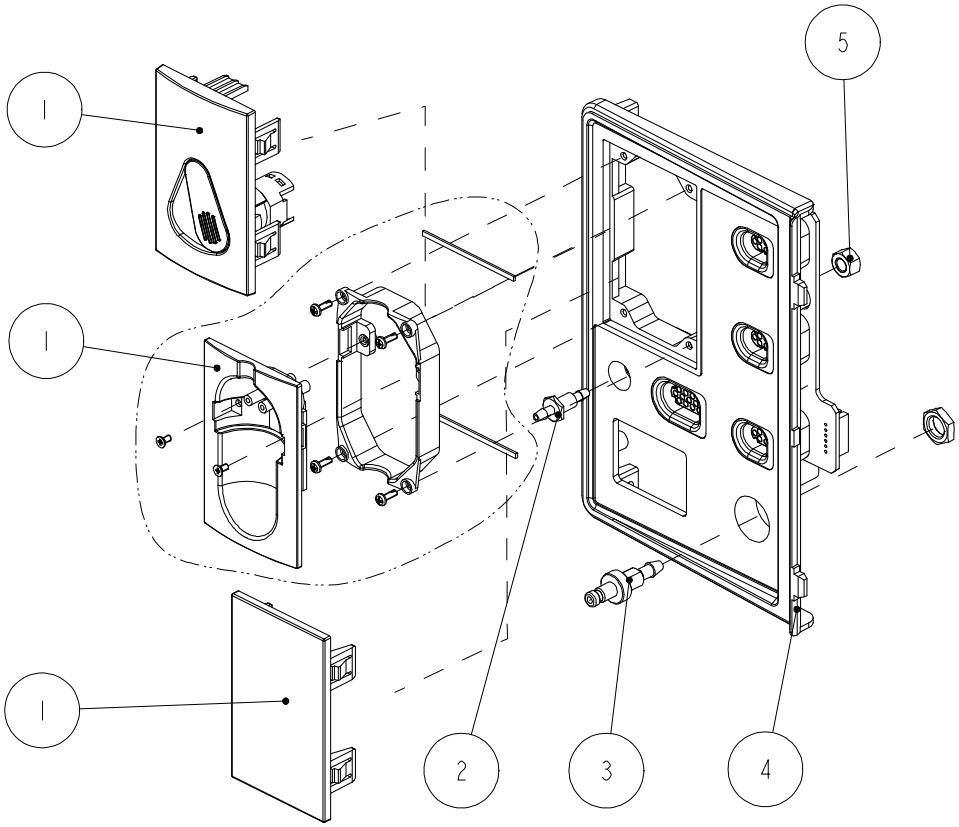


FIGURE 4-8 Patient Connector Sub-assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Blank Cover Plate, CO_2 Opening	6100-20-86297
1	Watertrap assembly, Sidestream CO_2	See DPM CO_2 Module Assembly
1	Assembly, Micro-stream CO_2 Receptacle	801-6100-00020-00
2	Gas Outlet	6200-20-11614
3	Assembly, NIBP Connector	DA6H-20-22833
4	Parameter Connector Panel	6100-30-86328
5	Nut, Stainless Steel M5 GB6170	N/A

4.10 NIBP Module Assembly

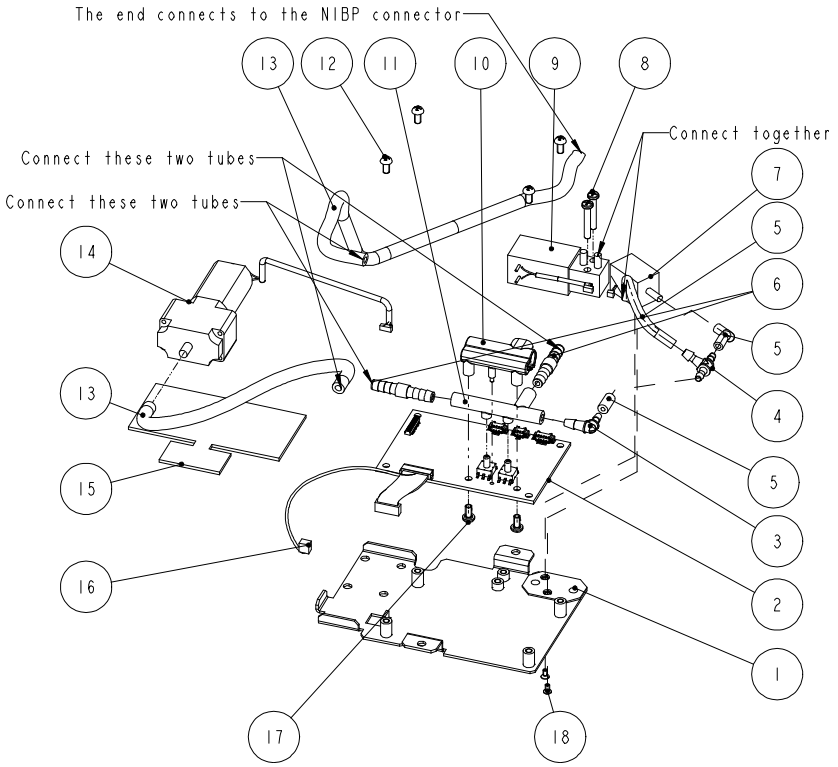


FIGURE 4-9 NIBP Module Assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Plate, NIBP Mounting	N/A
2	PCBA, NIBP PCBA module	801-6100-00019-00
3	Connector. Elbow Reduction, 1/8" & 3/32" ID, White	N/A
4	Connector Tee, 200Barb, 3/32" ID, White Nylon	N/A
5	Tubing. Silicone, 1/16" X 3/16", TYGON 3350 (1feet)	M6G-020006–
6	Air filter hose ID. 1/8", 25um	S1-0378-02-0004
7	Valve, Quick Deflate	801-6101-00012-00
8	Screw, Pan Head Phillips M3X18	N/A
9	Proportional solenoid valve: normally open	801-6101-00013-00
10	Frame, NIBP Tubing Retaining	N/A
11	Tubing, Silicone, Five Branch	N/A
12	Screw, Pan Head Phillips M3X6	N/A
13	TUBE. Silicone, 1/8" X 1/4" X100ft,2800546-100	A21-000002–
14	Pump	801-6101-00014-00
15	Cushion, Pump	6101-20-46761
16	Cable Assembly, NIBP	6100-20-86305
17	Screw, Self-Tapping PT2.6X6	N/A
18	Screw, Flat Head Phillips M2X4	N/A

4.11 Microstream CO_2 Module Assembly

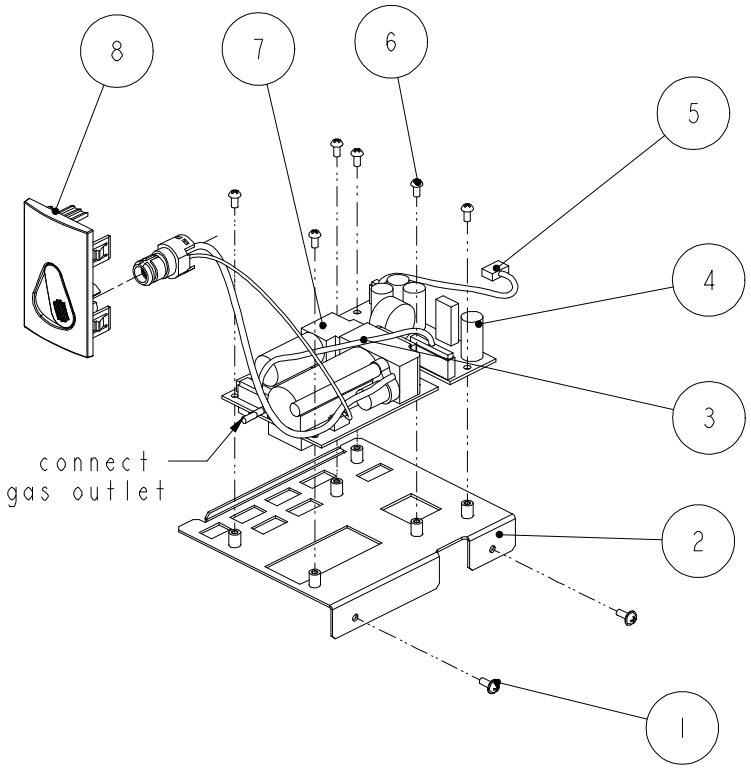


FIGURE 4-10 Microstream CO_2 Module Assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Screw, Pan Head W/Washer Phillips M3X6	N/A
2	Bracket, Micro-Stream CO_2 Mounting	N/A
3	Cable Assembly, Micro-Stream CO_2 to Transfer Board	9201-20-35932
4	PCBA, Micro-Stream CO_2 Transfer	N/A
5	Cable Assembly, Micro-Stream CO_2	9211-20-87247
6	Screw, Pan Head Phillips M3X6	N/A
7	Module, Micro-Stream CO_2	N/A
8	Assembly, Micro-stream CO_2 Receptacle	801-6100-00020-00

4.12 DPM CO_2 Module Assembly

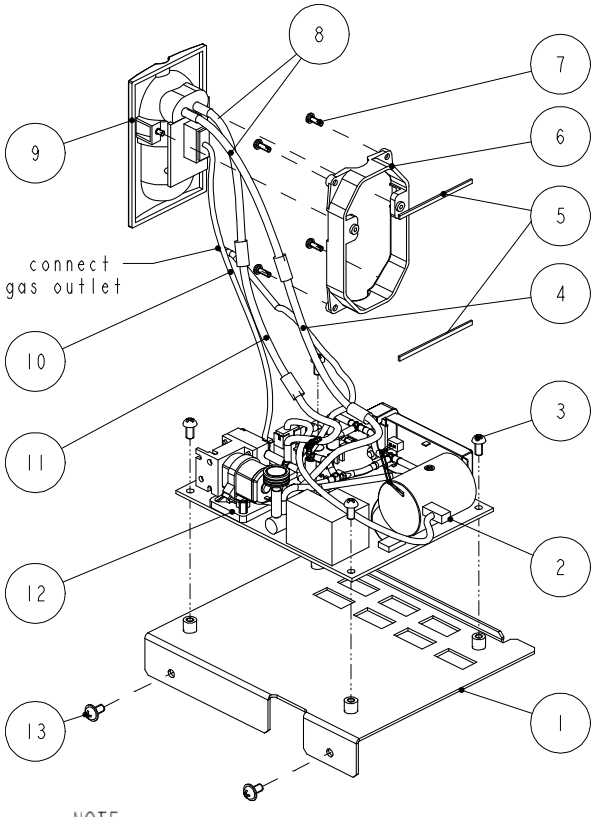


FIGURE 4-11 DPM CO_2 Module

ITEM NO	DESCRIPTION	PART NUMBER
1	Bracket, Sidestream CO_2 Mounting	N/A
2	Cable Assembly, Sidestream CO_2	6100-20-86321
3	Screw, Pan Head Cross Recessed M3X6	N/A
4	Moisture exchanger (Nafion Tube for DPM CO_2)	M02A-10-25936
5	Cushion, water trap receptacle	6100-20-86355
6	Mounting Frame. DRYLINE, Flush	040-000226-00
7	Screw, Pan head Self-Tapping PT2X6	N/A
8	Tubing(ID 1/16' OD 1/8') (20feet)	3001-10-07069
9	Flush Mount, Water Trap	040-000225-00
10	Flow restrictor tube	M02A-21-25944
11	Cable Assembly, Watertrap cable	009-000101-00
12	Module, CO_2 Host (M02B)	N/A
13	Screw, Pan Head W/Washer Phillips M3X6	M04-004012––

4.13 Masimo SpO_2 PCB Assembly

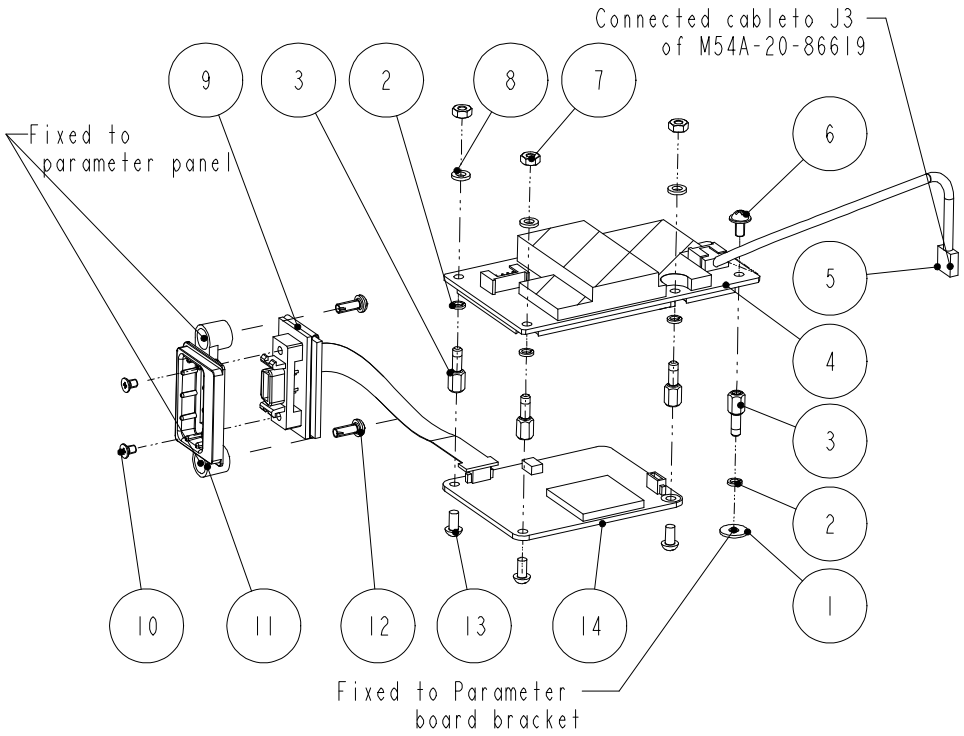


FIGURE 4-12 Masimo SpO_2 PCB Assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Large Flat Washer, GB96 3	N/A
2	Spring Washer, GB93 3	N/A
3	Screw, Stud M3X7	N/A
4	PCBA, Masimo Transfer Board	801-6101-00015-00
5	Communication cable. OEM SpO_2	9211-20-87242
6	Screw, Pan Head W/Washer Phillips M3X6	M04-004012––
7	Nut, Stainless Steel M3 GB6170	N/A
8	Washer, insulating 3X1mm	N/A
9	SpO_2 flex cable assembly 2685	040-000150-00
10	Screw, Flat Head PhillipsM2.5X4	N/A
11	Frame, Masimo SpO_2 Connector	6101-20-46720-52
12	Screw, Self-Tapping PT3X8	N/A
13	Screw, Pan Head Phillips M3X6	N/A
14	Masimo MS-2013 board	801-6101-00016-00

4.14 Nellcor SpO_2 Module Assembly

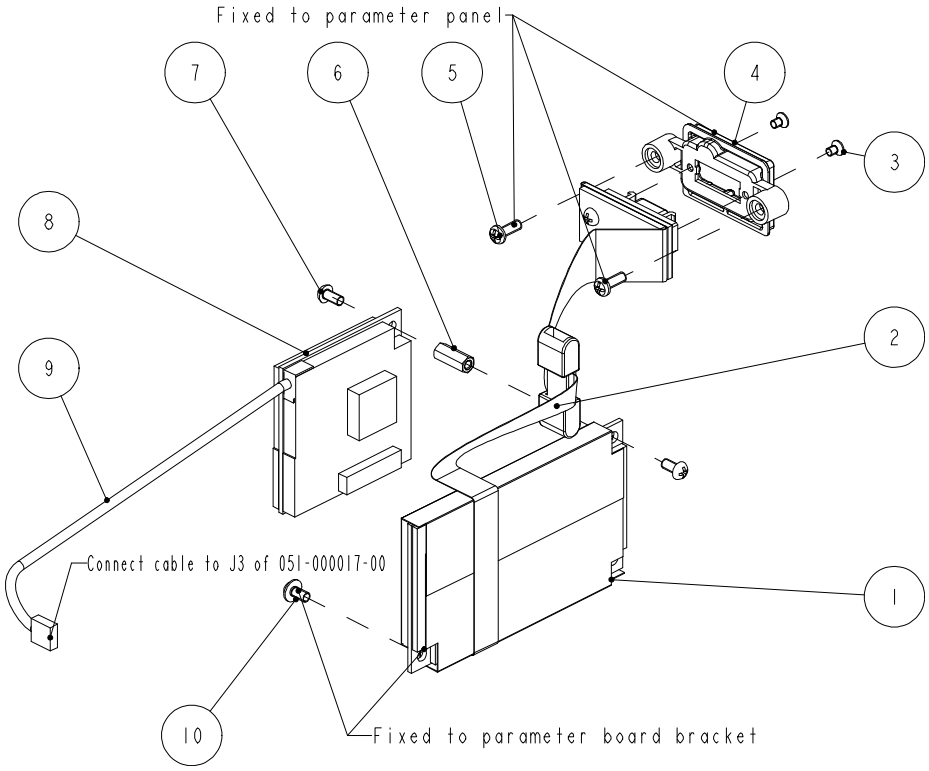


FIGURE 4-13 Nellcor SpO_2 Module Assembly

ITEM NO	DESCRIPTION	PART NUMBER
1	Nellcor SpO_2 board service kit	801-6100-00023-00
2	Nellcor cable assembly	801-6100-00022-00
3	Screw, Flat Head Phillips M2.5X4	N/A
4	Frame, Nellcor SpO_2 Interface	6101-20-46719-52
5	Screw, Self-Tapping PT3X8	N/A
6	Nut, Stud M3X12	N/A
7	Screw, Phillips Pan Head Washer M3X18	N/A
8	Isolated power and signal conversion board PCBA, Nellcor SpO_2 module	801-6101-00017-00
9	Communication cable. OEM SpO_2	9211-20-87242
10	Screw, Pan Head W/Washer Phillips M3X6	M04-004012–

5.0 *Calibration Procedure*

5.1 Introduction

The following procedures are provided to verify the proper operation of the **Passport V** Monitor. Service Diagnostics provides the capability of diagnosing problems within the **Passport V** hardware. A menu driven interface, similar to that of the **Passport V** user interface, is used to execute all tests.

CAUTION: Calibration is not to be performed while monitoring a patient.

5.2 Warnings and Guidelines

If the instrument covers are removed, observe the following warnings and general guidelines:

1. Do not short component leads together.
2. Perform all steps in the exact order given.
3. Use extreme care when reaching inside the opened instrument. Do not contact exposed metal parts which may become electrically active.
4. Read and understand each step of the procedure prior to beginning the step.

5.3 Test Equipment and Special Tools Required

- Digital/Mercury manometer with bulb and valve 0-500 mmHg - Accuracy 0.25% Full Range
- Test Chamber/Dummy Cuff - P/Ns 0138-00-0001-01 (700 cc), 0138-00-0001-03 (500 cc)
- Digital Voltmeter
- Patient Simulator
- Digital Flow Meter
- CO_2 Calibration Gas P/N 0075-00-0033-01
- Calibration Gas Regulator P/N 0119-00-0166
- GM Calibration Gas P/N 0075-00-0028
- Safety Analyzer-601 safety analyzer, Demsey Model 431, or equivalent

5.4 Services

To enter the Service mode:

1. Turn the power OFF.
2. Press and hold the **Mark Event** key while powering on the monitor. The Service Menu will appear on screen. Release the **Mark Event** key.
3. Rotate the Navigator™ Knob to move the cursor within the Service Menu. Pressing the Navigator™ Knob will select the desired test and open the second test menu.

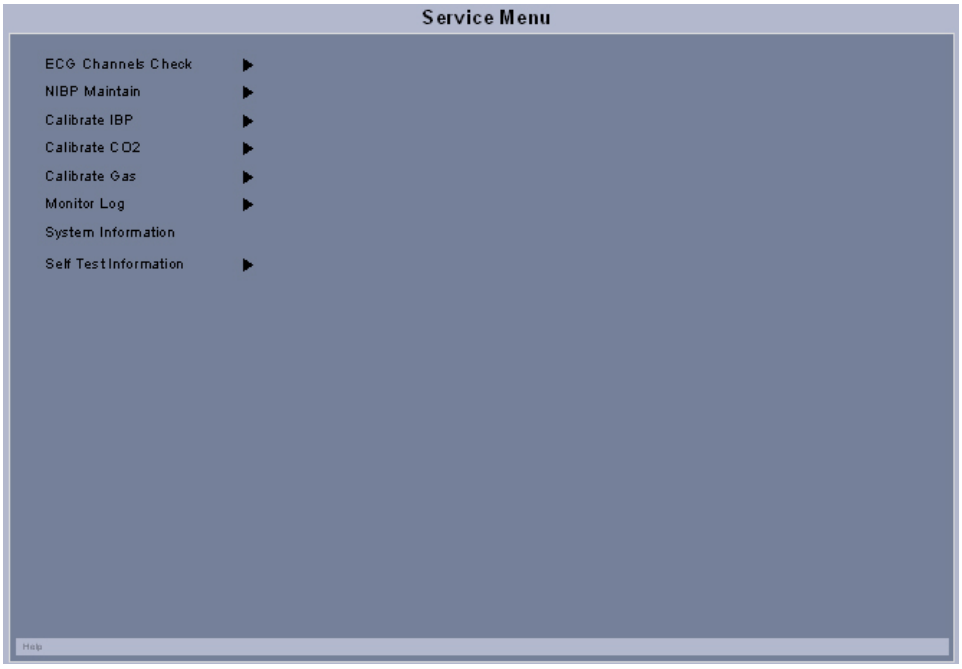


FIGURE 5-1 Service Menu

5.4.1 ECG Channels Check

The ECG signal may be inaccurate due to hardware or software problems. As a result, the ECG wave amplitude becomes greater or smaller. If so, the ECG module must be serviced.

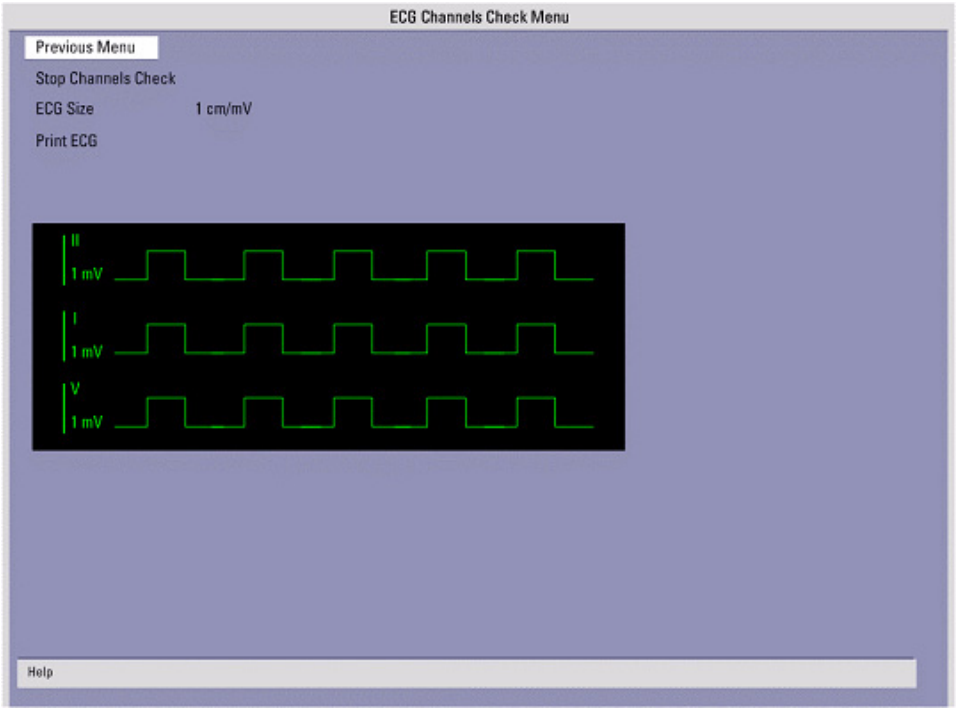


FIGURE 5-2 ECG Channels Check Menu

1. Select the ECG Channels Check button in the Service Menu
2. Use the Navigator™ Knob to select the Start Channels Check button and activate the test. A square wave should appear on the screen.
3. Compare the amplitude of the square wave with the wave scale. The difference should be within 5%.

5.4.2 NIBP Maintenance

The NIBP Maintenance offers the choice of NIBP Accuracy Test, NIBP Leakage Test, and Calibrate NIBP.

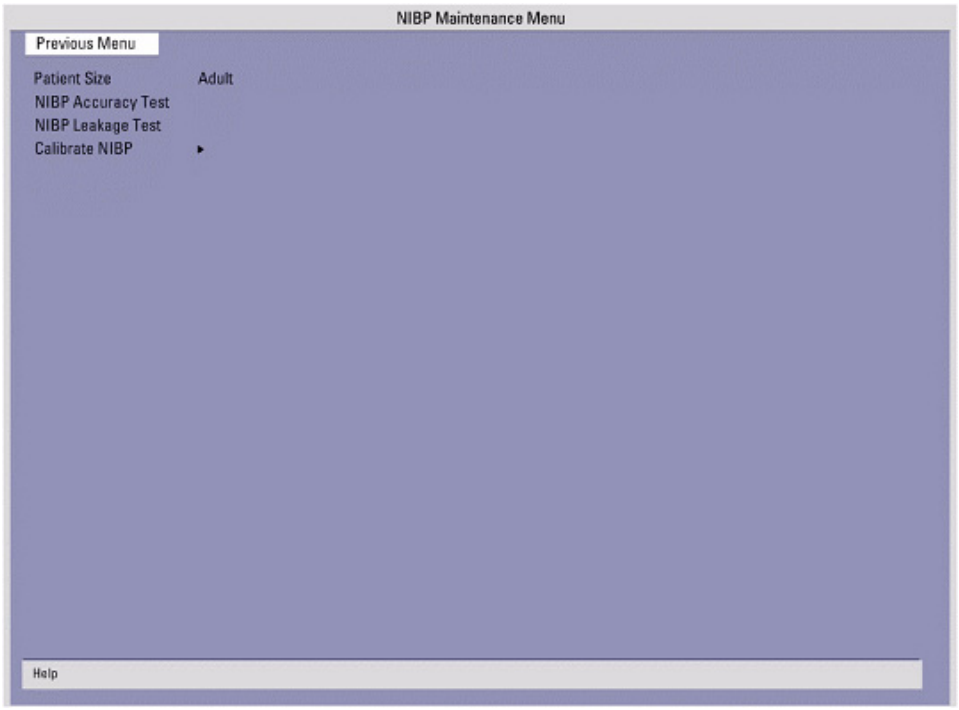


FIGURE 5-3 NIBP Maintenance Menu

5.4.2.1 NIBP Accuracy Test

1. Connect the equipment as shown in FIGURE 5-4.
2. Select NIBP Accuracy Test using the Navigator™ Knob to activate the test.
3. Using the manometer's bulb valve, raise the pressure in the test chamber to 300mmHg.
4. Compare the pressure displayed on the screen with the pressure viewed on the manometer. The difference between readings should not be greater than +/-3 mmHg.

NOTE: An NIBP simulator can be used to replace the reference manometer with the bulb valve to perform the test.

Specifications: 0 to 300 mmHg +/- 3 mmHg

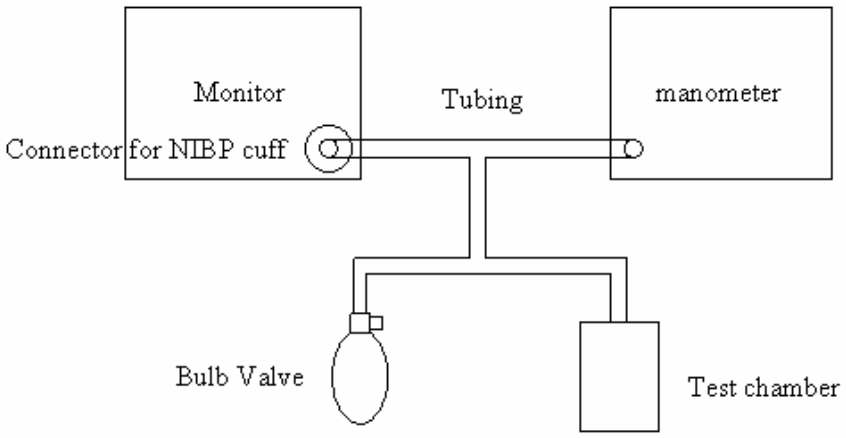


FIGURE 5-4 NIBP Accuracy Test

5.4.2.2 NIBP Leakage Test

The purpose of the leak test is to verify the leak rate of the pneumatic components.

1. Connect the dummy cuff/test chamber to the side panel fitting.
2. Select NIBP Leakage Test using the Navigator™ Knob to activate the test.
3. The chamber is inflating. At the same time, the "NIBP Leakage Test" button changes to "Stop Leakage Test", and the real-time pressure and the message "Leakage Testing…" appears in the prompt message area.
4. When the leakage test is completed, the button "Stop Leakage Test" changes back to "NIBP Leakage Test." If any leakage is detected, the message "NIBP Pneumatic Leak" appears.

5.4.2.3 NIBP Calibration

The purpose of this test is to verify the pressure transducer sensitivity for optimal accuracy.

1. Connect the equipment as shown in FIGURE 5-4.
2. Use the Navigator™ Knob to select Calibrate NIBP.
3. Select Inflate to activate the calibration. At the same time, the Inflate button changes to Accept.
4. Select Reference Pressure to set the calibration reference pressure.

NOTE: The reference pressure can be set from 240 mmHg to 260 mmHg. The default pressure is 250 mmHg and the input step is 1 mmHg.

5. When the pressure viewed on the manometer matches the reference pressure, select Accept to accept the calibrated result. The measured pressure will replace the reference pressure to complete the calibration.

NOTE: If the calibration is successful, the calibration time will be displayed in the format of year, month, day, hour, and minute. Otherwise, the calibration time is displayed as dashes.

NOTE: **During the calibration process, pressing the Deflate button will abort the calibration. However, if the calibration has already been accepted, it cannot be aborted.**

5.4.3 IBP Calibration

The purpose of this test is to verify the pressure transducer sensitivity for optimal accuracy.

1. Connect the patient simulator to the pressure connector on the module.
2. Set the pressure on the simulator to 0.
3. Press the Zero Key on the module to start a zero calibration.
4. Select Calibrate Pressure to set the calibration reference pressure. The default pressure is 200 mmHg.

NOTE: **The Calibrate Pressure is adjustable from 80 mmHg to 300 mmHg at 2 mmHg intervals.**

5. Adjust the simulator to match the calibration reference pressure.
6. If the value in the Calibrate IBP Menu does not match the calibration reference pressure, select Calibrate to calibrate the pressure module.

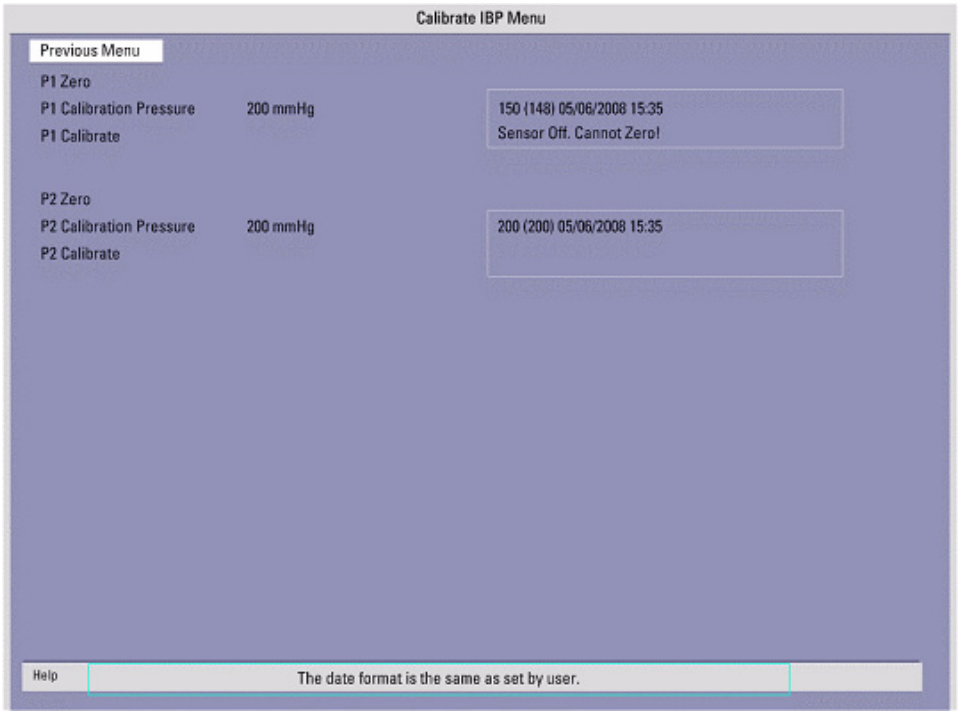


FIGURE 5-5 Calibrate IBP Menu

5.4.4 CO_2 Calibration

It is recommended that, in order to provide accuracy verification of the CO_2, calibration is performed once a year or whenever CO_2 readings appear suspicious. The date of the last successful calibration appears on the Calibration CO_2 Menu.

The CO_2 module must be warmed up before calibration.

NOTE: **For maximum accuracy during calibration, a 20 minute warm-up time is recommended.**

1. Use the Navigator™ Knob to select Calibrate CO_2.
2. Connect the gas cylinder with the tubing using a T- connector. Check the airway and make sure there are no leaks.
3. Select Zero on the Calibrate CO_2 Menu (only for Sidestream CO_2).

NOTE: **A zero (optional) is recommended before calibration. If zeroing fails, the message CO_2 Zeroing Failed appears. Otherwise, no message will appear.**

4. Adjust the concentration of the standard gas to 5%.

NOTE: **The concentration of the standard gas used to calibrate the Sidestream CO_2 module can be adjusted from 3% to 7% at 1% intervals. For the MicrostreamCO_2 module, it can be adjusted from 4.0% to 6.0% at 0.1% intervals.**

5. Make sure the CO_2 tubing is vented before flowing the gas. CO_2 readings will appear during the calibration.

NOTE: **If the Sidestream CO_2 module is used, the Calibrate CO_2 Menu will show the measured CO_2 concentration, atmospheric pressure, and sensor temperature. If the Microstream CO_2 module is used, the Calibrate CO_2 Menu will show the measured CO_2 concentration and atmospheric pressure.**

6. After the measured CO_2 concentration becomes stable, select Calibrate to calibrate the CO_2 module. Continue to steadily flow gas until a calibration message appears at the bottom of the calibration tile.
7. If the calibration is successful, the message "Calibration Completed Successfully" appears. Otherwise, the message "Calibration Failure" appears. If so, another calibration is required.

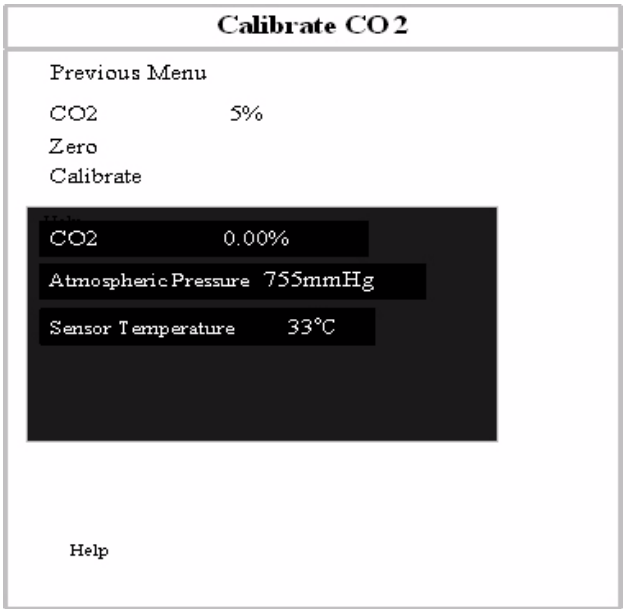


FIGURE 5-6 Sidestream CO_2 Calibrate Menu

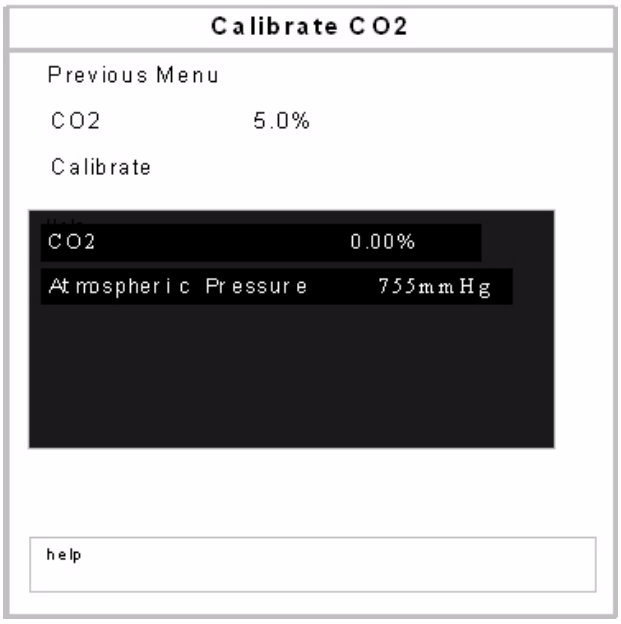


FIGURE 5-7 Microstream CO_2 Calibrate Menu

5.4.5 Gas Calibration

It is recommended that to maintain accuracy of the Gas Module 3, calibration is required once a year or whenever gas readings appear suspicious.

NOTE: Single gas calibration is intended for 5%CO_2 or 55%O_2 or 33%N_2O or 2%Des only. For mixed gas calibration, 5% CO_2, 55%O_2, 33% N_2O and 2% Des are calibrated simultaneously.

NOTE: The Gas Module 3 must fully warm up before performing a gas calibration. For maximum accuracy, a warm-up time of 10 minutes is recommended.

1. Use the Navigator™ Knob to select Calibrate Gas.
2. Connect the gas bottle and the tubing using a T-connector as shown in FIGURE 5-8.
3. Check the airway and make sure that there is no occlusion or leakage.
4. Press the Gas Selection button to select the type of calibration gas.
5. Select Start to activate a calibration. At the start of the calibration, the message "Zeroing…" will be displayed for each of the gas labels as the Gas Module zeros the gas channels. After zeroing is successful, the Gas Module will request the calibration gas as indicated in the next step.

NOTE: After the calibration is started, the module will begin zeroing, sampling, and calibrating automatically.

NOTE: If the Gas Module fails zeroing, a zeroing error will be displayed and the previous calibration data will be restored. If so, repeat the calibration procedure from step 1. If problems persist, contact Customer Support.

6. The message "Feed Calibration Gas" will be displayed. At this time, vent the desired standard gas or gas mixture to the tubing opening the gas valve. Gas values will appear in the window as the Gas Module samples the calibration gas.

7. When the calibration is completed, the message "Feed Calibration Gas" will disappear and the message "Complete" will be displayed next to each value that was successfully measured. If at least one gas was successfully measured, the Accept menu choice will become available. If the values are acceptable, select Accept. To cancel the calibration and restore the previous calibration data, select Abort.

NOTE: **When the Accept menu choice is selected, the message Disconnect Calibration Gas will be displayed. To avoid premature emptying of the gas bottle, always remove the regulator at the end of the procedure.**

NOTE: **For Gas Module 3, if any input data is corrupt or if there are any other errors, a Calibration Error message will appear after the Accept button is selected. The Gas Module 3 will not accept span calibration with errors in any channel.**

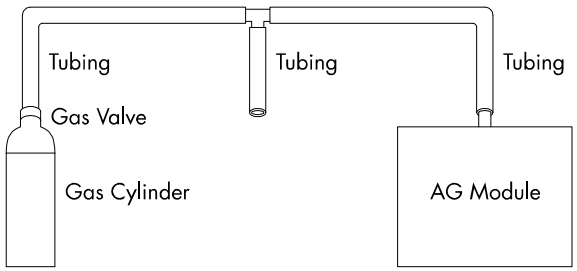


FIGURE 5-8 Gas Calibration

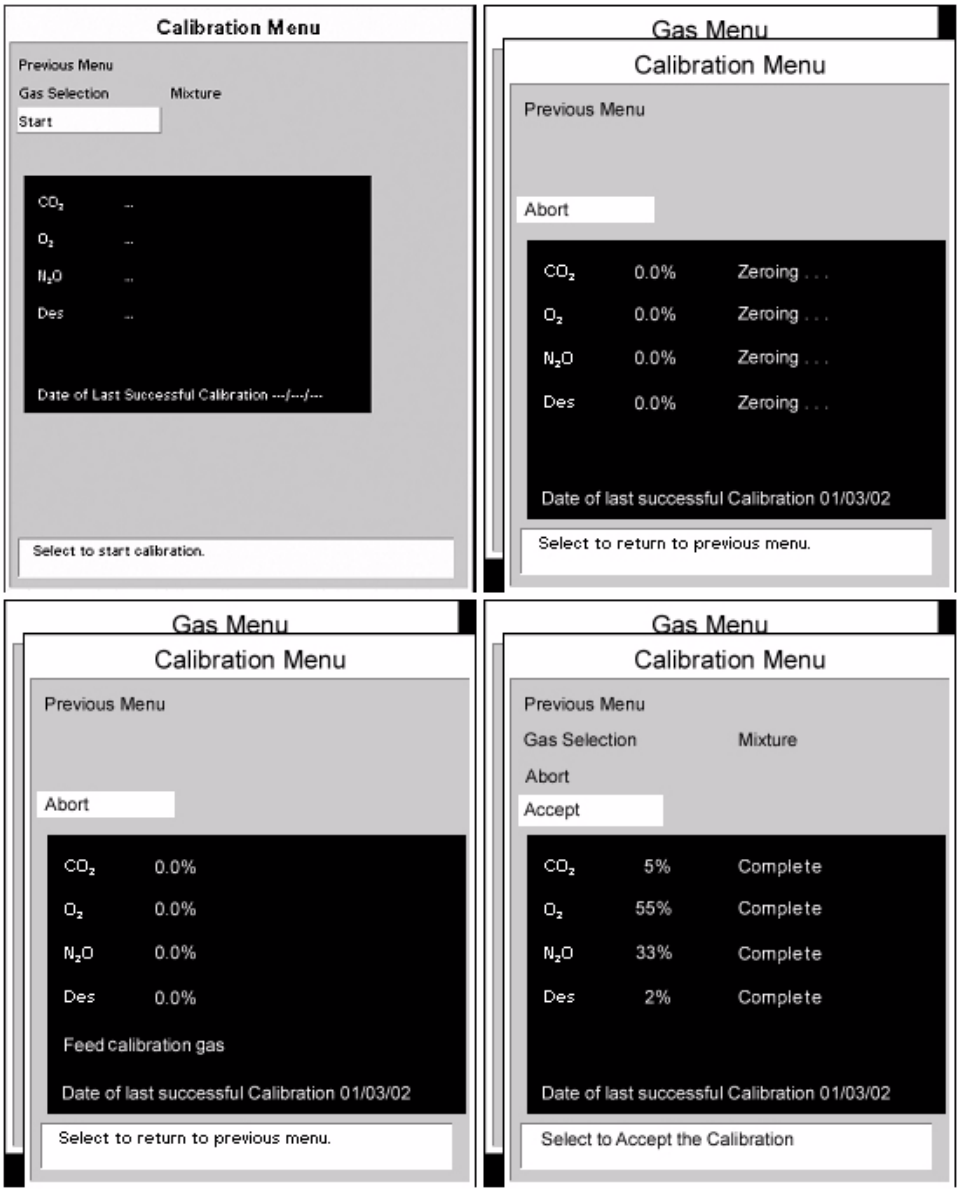


FIGURE 5-9 Calibration

5.4.6 Monitor Log

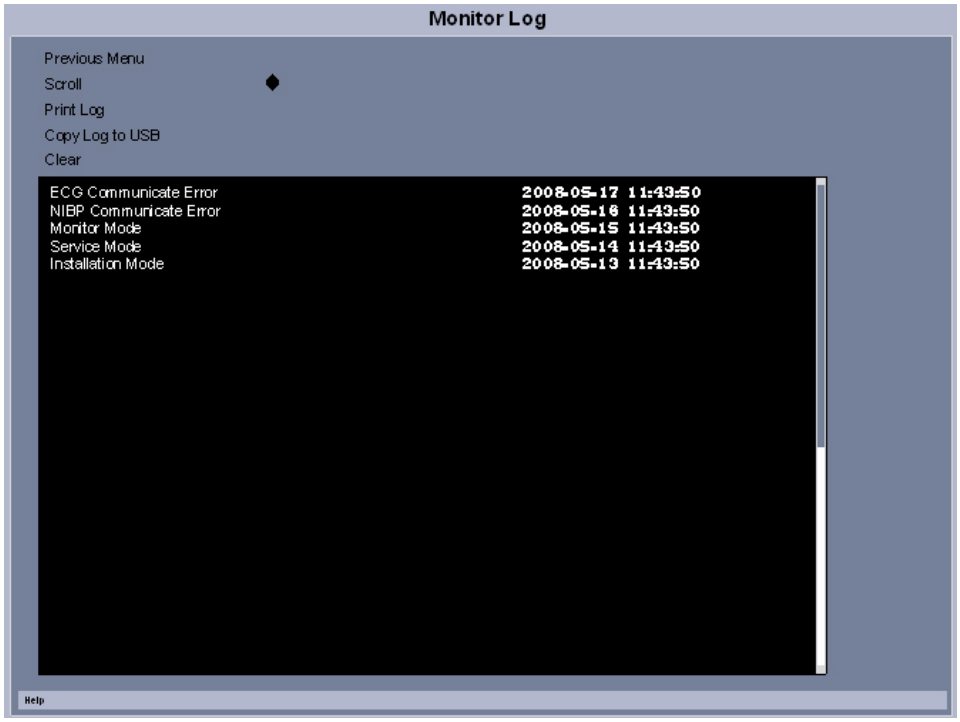


FIGURE 5-10 Monitor Log Menu

1. Select the Monitor Log using the Navigator™ Knob to enter the Monitor Log Menu.
2. Errors log will appear on screen. Each error is time stamped and dated.
3. Use the Navigator™ Knob to move the cursor within the list of errors.
4. To clear all data from the error log, use the Navigator™ Knob to select Clear.

5.5 Verification

5.5.1 Initial Set-up

1. Using a patient simulator, connect the ECG, IBP1, IBP2 and temperature cables to the left side connector panel. Set the ECG simulator for 60 bpms, 1mv QRS signal.

2. Set up the Patient Menu for Adult (Patient Size) as follows:

A. Monitor Setup

1. Display Setup – 3 Waveforms

2. ECG Speed – 25 mm/sec

3. IBP Speed – 25 mm/sec (optional)

4. Respiration / Gas Speed – 12.5 mm/sec

B. Print Setup

1. Waveform 1 – ECG 1

2. Waveform 2 – ECG 2

3. Select Printer – Local

C. Parameters

1. ECG

a. ECG 1 – II

b. ECG 2 – I

c. ECG 3 – III

d. ECG 1 thru 6 Size - 1 cm/mV

e. ECG 1 - I

f. ECG 2 - II

g. ECG 3 - III

h. ECG 4 - AVR

i. ECG 5 - AVL

j. ECG 6 – AVF

k. ECG 7 – V

2. NIBP

a. Set Start Pressure – 180 mmHg

Interval – 5 minutes

b. IBP1 – Scale 0 to 160 mmHg

c. IBP2 – Scale 0 to 80 mmHg

3. SpO_2

a. Averaging mode – 2

b. Sensor Off Audio – off

4. CO_2 (optional)

a. Apnea Delay – 60

b. Scale 40 mmHg

5. Respiration

a. Resp lead – II

b. Apnea Delay – 60

c. Resp source – Auto

d. Scale – 3

6. Gases (optional)

a. Select agent – Auto

b. O_2 scale - 100%

c. Agent scale– 10%

5.5.2 ECG

5.5.2.1 Initialization

1. Observe that the trace display sweeps across the waveform 1 screen in six (6) seconds. There should be six (6) complete ECG cycles. The same display and timing should be seen on the Waveform 2 screen.

2. Check the following sweep speeds for the appropriate displays:
12.5 mm/sec – 12 second sweep/window

5.5.2.2 Leads OFF

1. Disconnect one lead at a time RA, RL, LL, LA, and C (V) from the simulator and observe that the message Lead OFF appears on the display

2. Set the ECG simulator to Short Leads. Verify that the resolution does not exceed one pixel.

5.5.2.3 Pacer Detect

1. Set the Pacer Enhancement feature to ON in the ECG Setup Menu.

2. Set the ECG simulator to Ventricular Pacer.

3. Verify the pacer pulse (white line) is displayed before the R wave of the QRS signal.

Heart Rate

1. Set the ECG simulator to ECG QRS Waveform. Set the rate to 250 bpm.

2. Verify the Rate display is 250 ± 5 bpm.

3. Decrease the rate to 30 bpm and allow signal to stabilize. Verify that the rate display is 30 bpm ± 3 bpm.

Alarms

1. Set the simulator to 1mv ECG QRS signal, rate set to 60 bpm.

2. Set to Print on Alarm, install paper in the recorder, and set the Low HR alarm to 50 bpm, and High alarm to 120 bpm.

3. Increase the HR to 125 and verify the following:
   a. The high alarm violates with an audio tone and red LED on keypad.
   b. The recorder is initiated and prints the ECG strip displaying the ECG information.
   c. Verify the overall width of the grid is 40 mm ± 2 cm.
   d. Silence the alarm by pressing the **Silence All** key.
   e. Verify that the Silence Alarm message is displayed in the Message Area "A" and the alarm is silent.
4. Press the **Mark Event** key. Press the **Trends** key and examine the trend data. The high HR rate should be red (LCD) indicating the High HR was violated.

5.5.2.4 Performance Test

Tool required: Patient simulator

1. Connect the patient simulator to the ECG/Resp connector on the module.
2. Set HR output to 80 bpm in the ECG simulator.
3. The displayed HR value should be 80 ± 1 bpm for 3- and 5-lead ECG monitoring.

5.5.3 IBP 1 and IBP 2 Verification

1. Set the simulator to 0 mmHg for both IBP 1 and IBP2.
2. Press the **Zero All** key. Verify the systolic, diastolic and mean values display as 0 ± 1mm/Hg.
3. Apply 50,150, and 300 mmHg and verify that Sys/ Dia /Mean parameters match.
4. Apply a 120/80/mmHg signal into IBP 1 and apply a 60 / 20/ mmHg signal into IBP 2 and verify that the correct waveforms are displayed on the screen.

5.5.4 Temperature Verification

400 Series Probe

1. Set the Simulator to 37° C. Connect to the monitor using a 400 series probe.
2. Verify the temperature is 37° ± 0.1°C.

5.5.5 SpO_2 Verification

1. Connect the patient simulator to the SpO_2 connector on the monitor.
2. Select the model and the manufacturer of the SpO_2 module under test, and then configure the patient simulator as follows: SpO_2 96%; PR 80 bpm.
3. The displayed SpO_2 and PR values should be within the following ranges: DPM, Masimo, and Nellcor SpO_2: 96% ± 2% PR (bpm):80 ± 3
4. Verify that SpO_2 displays the pleth waveform, and the SpO_2 indicates a valid reading. Verify the HR source is SpO_2 and a beep tone is present.

CAUTION: A functional tester cannot be used to assess the accuracy of the pulse oximeter probe or a pulse oximeter monitor.

5.5.6 NIBP Verification

1. Connect the Adult cuff connector to the NIBP hose. Attach the NIBP hose to the Cuff connection on the left side of the monitor.

2. Apply cuff and press the **Start** key.
3. Verify the pump motor starts pumping and inflating the cuff to 180 mmHg (Adult).The cuff will begin to deflate and obtain a blood pressure reading of Sys/Dia/Mean in about 20 to 30 seconds after peak pressure is obtained.
4. Verify the reading on screen.

5.5.7 Battery Operation Verification

1. Remove the batteries if they are installed in the unit.
2. Verify that the unit functions properly, powered via line cord.
3. Install the two batteries in the appropriate slots located on the left side of the monitor.
4. Remove the line cord from the unit. Verify that the unit operation is not interrupted.
5. Remove one of the batteries and verify the unit still operates. Verify the second battery operates, if installed alone.

5.5.8 CO_2 Operation Verification

1. Connect the FilterLine® Short Term assembly to the input port of the CO_2 connector on the left side of the monitor.
2. Attach a can of Calibration Gas (P/N 0075-00-0033-01) to the Filterline Short Term assembly. Feed gas into monitor and verify the $ETCO_2$, Inspired CO_2 and respiration readings are displayed on the screen.

5.5.9 Leakage Current Tests

1. Plug the line cord of the unit into the safety analyzer. Connect the case ground lead of the analyzer to the equipotential lug of the monitor on the rear of the monitor.
2. Perform the tests under the following conditions:
   a. Case Grounded:
      Normal polarity
      Normal polarity with open neutral
   b. Case ungrounded:
      Normal polarity
      Normal polarity with open neutral
      Reverse polarity

Specifications: Verify the current reading of the test is less than 100 µA under normal operating conditions Less than 300 µA under a single fault condition for 120 VAC and less than 500 µA under a single fault condition for 230 VAC

Patient Leakage

1. Lead to ground: Sink Current Patient circuit (Test V, Model 431 Dempsey; patient leakage with line voltage on leads).

2. Connect the ground wire from the safety analyzer to the equipotential lug of the monitor.
3. Connect the ECG cable from the Analyzer to the monitor.
4. On the safety analyzer depress the Apply 115 VAC button and note the reading.
5. Repeat the test for normal and open ground polarity combinations.

Specifications: Verify the current readings of the test are below 50µA under a single fault condition.

6.0 *Preventative Maintenance*

6.1 User Preventative Maintenance Introduction

This chapter outlines routine user maintenance guidelines. The **Passport V** Monitor is designed for stable operation over long periods of time. Under normal circumstances, the monitor should not require technical maintenance beyond that described in this chapter. However, routine maintenance, calibration, and safety checks are recommended at least once a year or more often as required by local statutory or hospital administration practice.

6.2 Preventative Maintenance Schedule

The following is a list of activities required for periodic maintenance of the **Passport V** monitor. The physical inspection, replacement of consumable items, and performance checks should be performed at the recommended intervals stated below. Mindray DS USA, Inc. is not responsible for component failure or loss resulting from the use of stated consumable items beyond their recommended replacement interval.

6.2.1 Mechanical / Physical / Visual Inspection - Annually

Suggested Inspections for Wear and Abuse:

1. Inspect outer case, line cords, rolling stands, wall mounts, modular accessories and interconnecting cables.
2. Inspect patient interface connections (ECG, IBP, SpO_2, Temp, CO_2, and NIBP).

6.2.2 Visual test

1. Perform when first installed or reinstalled.

6.2.3 Power on test

1. Perform when first installed or reinstalled.
2. Perform following any maintenance or the replacement of any main unit parts.

6.2.4 Perform NIBP Verification and Calibration – Annually

1. Perform NIBP test. See “NIBP Verification” on page 5-14.
2. Perform NIBP calibration. See “NIBP Calibration” on page 5-5.

6.2.5 Perform CO_2 Verification and Calibration – Annually

1. Perform CO_2 test. See “CO_2 Operation Verification” on page 5-15.
   Perform every 12 months thereafter, and each time the unit is serviced.
2. Perform CO_2 calibration. See “CO_2 Calibration” on page 5-6.
   Perform every 12 months thereafter, and each time the unit is serviced.
3. For DPM CO_2, replace the CO_2 assembly after 20,000 operating hours or as required by the service code.

6.2.6 Perform IBP Verification and Calibration – Annually

1. Perform IBP test. See “IBP 1 and IBP 2 Verification” on page 5-14.
2. Perform IBP calibration. See “IBP Calibration” on page 5-6.

6.2.7 Perform ECG Verification – Annually

1. Perform ECG test. See “ECG” on page 5-13.
2. Perform ECG channels check. See “ECG Channels Check” on page 5-3.

6.2.8 Perform Verification and Gas Calibration – Annually

1. Perform Gas test. See "Verification" on page 5-12.
2. Perform Gas calibration. See "Gas Calibration" on page 5-8.

6.2.9 Temperature Perform Verification – Annually

1. Perform temperature test. See "Temperature Verification" on page 5-14.

6.2.10 SpO_2 Perform Verification – Annually

1. Perform SpO_2 test. See "SpO_2 Verification" on page 5-14.

6.2.11 Electrical Safety Tests – Annually

1. Perform test. See "Leakage Current Tests" on page 5-15.

6.3 Care and Cleaning of the Monitor

The monitor enclosure may be cleaned with a mild soap and water solution or ammoniated window cleaner. Apply cleaning solution to the cloth, not directly onto the monitor. DO NOT apply large amount of liquid. DO NOT use abrasive cleaning agents or organic solvents.

WARNING: Do not clean the monitor while it is powered on and/or plugged in.

To prevent scratches on the screen, carefully brush dust and dirt particles with a soft sponge moistened with cleaning solution or a fine, soft-hair brush. DO NOT use abrasive cleaning materials. Remove fingerprints and stains with a liquid lens cleaner and a soft cloth. DO NOT wipe a dry screen or use alcohol or solvents containing chlorinated hydrocarbon.

6.3.1 Decontamination of the Monitor

WARNING: Perform the decontamination process with the unit powered off and the power cord removed.

Decontamination of a unit that has come in contact with a biological material can be performed using LpH SE Germicidal detergent. Apply a small amount of detergent to a disposable wipe (paper based) and wipe down the outside of the unit. Discard the wipe appropriately. After waiting 10 minutes, use a clean dry wipe to dry the unit.

CAUTION: When cleaning the monitor, do not allow cleaning solutions into the vent openings.

6.4 Care and Cleaning of SpO_2 Sensors

NOTE: Refer to the individual instruction sheets that are packaged with each sensor.

1. Check sensors and cables daily for signs of damage. Replace as required.
2. Sensors should be cleaned before and after each new patient.
3. Wipe the patient contact area using a soft cloth with mild soap and water solution or isopropyl alcohol. Hydrogen peroxide can be used to remove dried blood.
4. Allow the sensor to completely dry before using.

CAUTION: When cleaning sensors, do not use excessive amounts of liquid. Wipe the sensor surface with a soft cloth dampened with cleaning solution. Do not attempt to sterilize.

6.4.1 Cleaning and Re-use of a Nellcor® Sensor

Sensors may be reattached to the same patient if the emitter and detector windows are clear and the adhesive still adheres to the skin. The adhesive can be partially rejuvenated by wiping with an alcohol wipe and allowing the sensor to thoroughly air dry prior to replacement on the patient.

Do not immerse any Oxisensor®, OxiMax®, Durasensor®, Oxiband®, or Duraform® oxygen transducers, the Nellcor® RS-10 or Max-Fast® oxygen transducers, or any Nellcor® adhesive in water or cleaning solution. Clean Durasensor®, Oxiband®, and Duraform® oxygen transducers, and the Nellcor® RS-10 or Max-Fast® oxygen transducers by wiping with a disinfectant such as a solution containing 70% alcohol. Do not sterilize by irradiation, steam, or ethylene oxide. Use a new Oxiband® adhesive wrap or FORM-A adhesive bandage for each patient. Do not re-sterilize Oxisensor® or OxiMax® oxygen transducers.

6.5 Cleaning CO_2 Sensors, Adapters and Sampling Components

Microstream CO_2 patient monitoring accessories are designed for single patient use and should not be cleaned or reused.

6.6 Sterilization and Cleaning of Cuffs

NOTE: Accuracy of cuff-pressure transducers/indicators is to be verified at intervals specified by the manufacturer.

6.6.1 Reusable Cuffs with Bladders

Remove the bladder from the cuff before cleaning and disinfecting the cuff.

Cleaning

The cuff can be hand washed or machine washed in warm water or with mild detergent. The bladder can be cleaned with a damp cloth. Air dry the cuff thoroughly after washing.

NOTE: Machine washing may shorten the service life of the cuff.

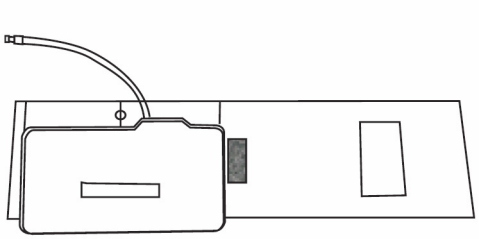
Disinfection

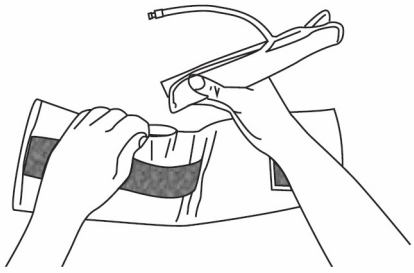
The cuff may be disinfected with a damp cloth with 70% isopropanol and water. It may also be disinfected with ultraviolet. The bladder can only be disinfected with ultraviolet.

NOTE: Prolonged use of disinfectant may cause discoloration of the cuff.

Replace the bladder after cleaning and disinfecting the cuff, as follows:

1. Place the bladder on the top of the cuff, as the figure shows.
2. Roll the bladder lengthwise and insert it into the large opening. See the figures below.
3. Hold the hose and the cuff and shake the complete cuff until the bladder is in position.
4. Thread the hose from inside the cuff, and out through the small hole under the internal flap.





CAUTION: Do not dry clean the cuff.
Do not press the cuff with a hot iron.
Do not use detergent and disinfectant other than fresh water or 70% isopropanol.
Clean and disinfect the cuff according to the instructions.

6.6.2 Reusable Bladderless Cuffs

Clean cuffs with warm water and a mild detergent. Do not use a detergent containing hand conditioners, softeners, or fragrances.

NIBP cuffs can be sterilized with gamma sterilization without affecting the repeated performance of the cuff. Steam sterilization is not recommended. Use of a washing liquid containing bleach is not recommended because chlorine will chemically break down the urethane on the inside of the cuff.

Antimicrobial Definition

Bladderless cuffs are treated with an antimicrobial coating. Antimicrobial technology effectively controls a broad spectrum of bacteria, fungi, algae and yeasts on a wide variety of treated substrates.

6.6.3 Disposable Blood Pressure Cuffs

Disposable cuffs are intended for single patient use only. Once a cuff is used on a patient it should be discarded. Do not use the same cuff on any other patient. Do not sterilize or use an autoclave on disposable cuffs.

CAUTION: Disposable cuffs can be cleaned using a mild soap solution and dried with a clean cloth.

6.7 Care and Cleaning of Gas Module

The Gas Module enclosure may be cleaned with a mild soap and water solution or ammoniated window cleaner. Apply cleaning solution to the cloth, not directly onto the Gas Module. DO NOT apply large amounts of liquid. DO NOT use abrasive cleaning agents or organic solvents.

CAUTION: Do not clean the Gas Module while it is on and/or plugged in.

CAUTION: The internal sampling system of the Gas Module does not need to be cleaned or sterilized. There is no reverse flow back to the patient. If the internal sampling system is suspected to be clogged or dirty, the module should be serviced by an authorized service person only.

1. The Water Trap Reservoir must be checked and emptied whenever changing patients or if it is more than half full.

- To remove the water trap, push the water trap latch to the right. The water trap is spring loaded and will pop out. An Air Leak message will be displayed. The monitor will suspend sampling.
- Detach the reservoir from the water trap assembly by pulling it down carefully.
- Empty the reservoir and rinse with water only.
- Re-attach the reservoir to the assembly tightly.
- Re-install the whole unit into the Gas Module making sure the latch is set. Check that the Air Leak message disappears and monitoring resumes.

NOTE: Do not disinfect or open the water trap. If an occlusion message appears it may be necessary to replace the water trap assembly part number 0202-00-0129.

The Water Trap Assembly must be replaced every two months.

6.8 Care and Cleaning of 3- and 5-lead ECG Cables and Leadwires

Recommended cleaning method of ECG cables and leadwires is a cloth wipe using ordinary alcohol-free hand soap or USP green soap tincture. When disinfection is required, a cloth wipe using disinfectants such as isopropyl alcohol, chlorine bleach in water (1:10 mixture) or 2% Glutaraldehyde solution (i.e., Cidex) is recommended. After cleaning, the ECG cables and leadwires should be wiped with water using a clean damp cloth, and then dried with a clean dry cloth.

CAUTION: **To avoid permanent damage, do not expose metal components (pins, sockets, snaps) to disinfectants, soaps or chemicals.**

NOTE: **ECG cables and leadwires must never be immersed, soaked in any fluids, and they should not be cleaned with harsh chemicals such as acetone or non-diluted bleach.**

NOTE: **Do not autoclave, radiation or steam sterilize ECG cables or leadwires.**

NOTE: **Extended exposure to Ethylene Oxide gas may shorten life of the ECG cables and leadwires, leading to poor signal quality.**

6.9 Battery Replacement and Maintenance

6.9.1 Battery Replacement

1. Open battery compartment door, on left side of unit, by pressing the finger grip area and sliding the door to the left.
2. Press the release button, located on the left-upper side of the installed battery. This will eject the battery. Slide out old battery.
3. Slide in replacement battery until it clicks into place.
4. Close battery compartment door by sliding the door to the right until it firmly clicks into place.

6.9.2 Battery Maintenance

The batteries may be subject to local regulations regarding disposal. At the end of the battery life, dispose of the batteries in accordance with any local regulations.

CAUTION: Recharge batteries in the Passport V .

CAUTION: Remove the batteries if the Passport V is not likely to be used for an extended period of time.

Lithium-Ion

Storage of the lithium-ion batteries depends on temperature, time period and the degree of cell charging state. After one month of storage at 23 degree, fully charged lithium-ion batteries have a retention capacity of 96%.

6.10 Recorder Maintenance

6.10.1 Cleaning the Recorder Printhead

If the recorder has been used for a long time, deposits of paper debris may collect on the printhead, compromising the print quality and shortening the life of the roller. Follow this procedure to clean the printhead:

1. Take measures against static electricity such as wearing a Disposable Wrist Strap for the work.
2. Open the recorder door and remove the paper.
3. Gently wipe around the printhead using cotton swabs dampened with alcohol.
4. After the alcohol has been dried completely, reload the paper and close the recorder door.

CAUTION: Do not use anything that may destroy the thermal element.

CAUTION: Do not add unnecessary force to the thermal head.

6.10.2 Recorder Paper Replacement

The instructions below describe the replacement of recorder paper. Use only recommended thermal paper. This ensures that the print quality is acceptable and reduces print head wear.

1. Use the latch at the upper right corner of the recorder door to pull the door open.
2. Remove the empty paper spool.
3. Insert a new paper roll so that it fits snugly into its housing and the sensitive side of the paper faces the print head at the top of the recorder (paper feeding off of the spool from the bottom).
4. Pull out approximately 4 inches of paper.
5. Align the paper across the top of the roller.
6. Holding the paper in place, close the recorder door.
7. To ensure that the paper is aligned properly and has not been pinched in the door, pull the loose edge out a couple of inches. If the paper jams, open the door and return to step 5.

CAUTION: Never pull the recorder paper with force when a recording is in process. Otherwise, it may cause damage to the recorder.

CAUTION: Do not leave the recorder door open unless you reload paper or remove troubles.

6.10.3 Care and Storage of Thermal Chart Paper

Thermal Chart Paper is chemically treated and the permanency of a recording is affected by storage and handling conditions. These conditions are:

- **Ultraviolet Light**
  We recommend storing the recordings in a filing cabinet within a few days of printing. Long term exposure to natural or artificial U.V. sources is detrimental.
- **Storage Temperature and Humidity**
  Keep the recordings in a cool and dry area for a longer lasting image. Extreme temperature and humidity (above 80° F/26° C and 80% humidity) should be avoided.
- **Solvent Reactions**
  Do not store the recordings in plastic bags, acetate sheet protectors, or similar items made from petroleum products. These products emit a small amount of vapor which will, over a period of time, deteriorate the image on the chart paper.
- **Adhesive Tape**
  Never place adhesive tape over recordings. The reaction between the adhesive compound and the chemical/thermal paper can destroy the image within hours.
- **Archives**
  We recommend that if long term archives are required, make a photocopy of the recordings as back-up. Under normal office filing conditions, the recordings should retain acceptable image quality for about five years

6.11 Warranty Statements

Mindray DS USA, Inc. warrants that components within the monitor unit will be free from defects in workmanship and materials for the number of years shown on the Mindray invoice. Under this extended warranty, Mindray DS USA, Inc. will repair or replace any defective component at no charge for labor and/or materials. This extended warranty does not cover consumable items such as, but not limited to batteries, displays, external cables and sensors.

Recommended preventative maintenance, as prescribed in the service manual, is the responsibility of the user, and is not covered by this warranty.

Except as otherwise provided herein, the terms, conditions and limitations of Mindray DS USA, Inc.'s standard warranty will remain in effect.

6.11.1 USA, Canada, Mexico, and Puerto Rico

Mindray DS USA, Inc. warrants that its products will be free from defects in workmanship and materials for a period of one (1) year from the date of purchase except that disposable or one-time use products are warranted to be free from defects in workmanship and materials up to a date one year from the date of purchase or the date of first use, whichever is sooner. This warranty does not cover consumable items such as, but not limited to, batteries, external cables, sensors, cuffs, hoses, or mounts.

Mindray DS USA, Inc. will not be liable for any incidental, special, or consequential loss, damage, or expense directly or indirectly arising from the use of its products, liability under this warranty and the buyer's exclusive remedy under this warranty is limited to servicing or replacing at Mindray's option at the factory or at an authorized Distributor, any product which shall under normal use and service appear to the Company to have been defective in material or workmanship.

No agent, employee, or representative of Mindray DS USA, Inc. has any authority to bind Mindray DS USA, Inc. to any affirmation, representation, or warranty concerning its products, and any affirmation, representation or warranty made by any agent, employee, or representative shall not be enforceable by buyer.

This warranty is expressly in lieu of any other express or implied warranties, including any implied warranty or merchantability or fitness, and of any other obligation on the part of the seller.

Damage to any product or parts through misuse, neglect, accident, or by affixing any non-standard accessory attachments or by any customer modification voids this warranty. Mindray DS USA, Inc. makes no warranty whatever in regard to trade accessories, such being subject to the warranty of their respective manufacturers.

A condition of this warranty is that this equipment or any accessories which are claimed to be defective be returned when authorized by Mindray, freight prepaid to Mindray DS USA, Inc., Mahwah, New Jersey 07430. Mindray DS USA, Inc. shall not have any responsibility in the event of loss or damage in transit.

Calibration may be performed without the need to disassemble the instrument. It is the responsibility of the purchaser to perform calibration as necessary, in accordance with the instructions provided in this manual.

6.11.2 International (excluding North America)

Mindray DS USA, Inc. warrants that its products will be free from defects in workmanship and materials for a period of two (2) years from the date of purchase except that disposable or one-time use products are warranted to be free from defects in workmanship and materials up to a date one year from the date of purchase or the date of first use, whichever is sooner. This warranty does not cover consumable items such as, but not limited to, batteries, external cables, sensors, cuffs, hoses, or mounts.

Mindray DS USA, Inc. shall not be liable for any incidental, special, or consequential loss, damage, or expense directly or indirectly arising from the use of its products, liability under this warranty and the buyer's exclusive remedy under this warranty is limited to servicing or replacing at Mindray's option at the factory or at an authorized Distributor, any product which shall under normal use and service appear to the Company to have been defective in material or workmanship.

No agent, employee, or representative of Mindray DS USA, Inc. has any authority to bind Mindray DS USA, Inc. to any affirmation, representation, or warranty concerning its products, and any affirmation, representation or warranty made by any agent, employee, or representative shall not be enforceable by buyer.

This warranty is expressly in lieu of any other express or implied warranties, including any implied warranty or merchantability or fitness, and of any other obligation on the part of the seller.

Damage to any product or parts through misuse, neglect, accident, or by affixing any non-standard accessory attachments or by any customer modification voids this warranty. Mindray DS USA, Inc. makes no warranty whatever in regard to trade accessories, such being subject to the warranty of their respective manufacturers.

A condition of this warranty is that this equipment or any accessories which are claimed to be defective be returned when authorized by Mindray, freight prepaid to Mindray DS USA, Inc., Mahwah, New Jersey 07430. Mindray DS USA, Inc. shall not have any responsibility in the event of loss or damage in transit.

Calibration may be performed without the need to disassemble the instrument. It is the responsibility of the purchaser to perform calibration as necessary, in accordance with the instructions provided in this manual.

6.11.3 Phone Numbers and How To Get Help

Mindray DS USA, Inc. maintains a network of service representatives and factory-trained distributors. Prior to requesting service, perform a complete operational check of the instrument to verify proper control settings. If operational problems continue to exist, contact the Service Department (800) 288-2121or (201) 995-8000 for assistance in determining the nearest field service location.

Please include the instrument model number, the serial number, and a description of the problem with all requests for service.

Any questions regarding the warranty should be directed to the closest authorized location. A list of international offices, along with their phone numbers, is provided at the end of this manual.

6.11.4 Manufacturer's Responsibility

Mindray DS USA, Inc. is responsible for the effects on safety, reliability and performance of the equipment only if:

- **a.** Assembly operations, extensions, readjustments, modifications or repairs are carried out by persons authorized by Mindray; and
- **b.** The electrical installation of the relevant room complies with the appropriate requirements; and
- **c.** The equipment is used in accordance with the instructions for use.

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